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NATIONAL URBAN PESTICIDE APPLICATOR SURVEY: FINAL REPORT

OVERVIEW AND RESULTS

by

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16. Abstract (Limit: 200 words)

A study has just been completed of pesticide usage in three sectors of the commercial pest control industry-tree, lawn and structural. This study was funded by the EPA and was jointly sponsored by the three trade associations representing these sectors and the Association of American Pesticide Control Officials.

A total of 2,838 firms in the industry responded to the survey by providing data for the year 1981. They represented all regions of the country, and all firm sizes. The sample included firms belonging to the cooperating trade associations and other firms as well.

About one out of every three eligible businesses from individual state licensing lists was included in the sample. All states except North Dakota and Alaska participated. Sample selection was in accordance with a probability-based design permitting valid statistical inferences for each industry sector and geographical region.

Respondent eligibility criteria are indicative of the scope of the survey. A business was eligible if it--1) was on a state licensing list, 2) was in' business in 1981, 3) provided commercial pest control services, and 4) did not provide strictly agricultural pest control services.

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FOREWARD

The Foreward of this report consists of contributions from the sponsoring trade associations, the Association of American Pesticide Control Officials (AAPCO), and EPA that describe their respective perceptions of the intent and usefulness of the National Urban Pesticide Applicator Survey (NUPAS).

A. Trade Association Assessment of NUPAS

NATIONAL ARBORIST ASSOCIATION (NAA)

3537 Stratford Road
Wantagh, New York 11793

NATIONAL PEST CONTROL ASSOCIATION (NPCA)

8100 Oak Street
Dunn Loring, VA 22027

PROFESSIONAL LAWN CARE ASSOCIATION OF AMERICA (PLCAA)
1225 Johnson Ferry Rd.
Suite B-220
Marietta, GA 30067

NATIONAL URBAN PESTICIDE APPLICATORS SURVEY (NUPAS) --

A Profile of The Urban Pesticide Applicator Industry

The above topic title states succinctly the purpose that the three trade associations, i.e., the structural applicators (NPCA), the arborists (NAA), and the lawn care specialists (PLCAA) shared with the state regulatory officials (AAPCO), and the Environmental Protection Agency (EPA), in working together to design and carry out this pioneering project. Industry needed documentation in 1981 of their estimates for the number of firms in their respective specialty fields; the number, role and qualifications of the persons employed to provide services by these firms; the types and amounts of services provided in the various regions of the nation; and what control procedures, including pesticides, are most frequently utilized in providing services to the public. Government obviously needed the same information for regulatory needs assessment. The data on what industry tools, i.e., pesticides, et al, are used, in what amounts, where, and for what purposes are of greater interest and value to EPA and the states to assist them in benefits versus risks decision making compared to industry's need for these types of data.

The urban pesticide applicator industry needs accurate information to better describe services made available to the nation's consumers and how these might be expanded or strengthened.

The dues paying membership of the three trade associations represents only part of the total industry firms or applicators registered to provide service in the nation. The national trade association's membership, however, in most instances provides the greatest amount of services to the buying public. All of us, thus, can benefit from collection of data that is not restricted to the national association dues paying membership but instead is collected from a cross section of everyone in the urban pesticide applicator business.

The industry associations expected from the NUPAS, at the outset, specific information of the following types:

1. Quantitative data - i.e., the number of firms by size (i.e. range of gross sales) and number of personnel employed according to role and their qualifications (training and experience) in pesticide use.
2. Descriptive data - i.e., pest management practices used, major sites serviced, i.e., structure types and the pests treated. We wanted information on the pesticides used, in what amounts for these factors as well as information on other techniques for obtaining control, the safety measures used and identification of problems most frequently encountered by the industry in using, storing or disposing of pesticides and containers.

All of the above expectations were not realized from the 1981 NUPAS survey. Expectations must always be adapted to what is the most cost effective to collect in any survey. The cost in terms of time for operators to supply the information and the money that would be available to collect it required industry and government to compromise and focus only on what was practical and most valuable to ask for and likely to be provided by the nation's busy applicator firms. The industry trade associations helped by field testing sample questionnaires to arrive at the best questions to ask, how to ask for it and to identify those questions that are not likely to receive usable answers. This preliminary testing was helpful but still some questions included in the survey did not yield usable responses or sufficient information to be reliable.

The 1981 NUPAS project provides many positives. It makes available data that allows the urban pesticide applicator industry to tell a better benefits story in regards to the pesticides it uses.

It can help us to more accurately describe what we do to protect and service the nation's homes, offices, stores and warehouses, their contents and the greenery that surrounds them. What are some of the positives? Here are a few:

- The survey is a milestone in government agency, industry relations. Three trade associations were involved with the beginning, middle and end of the three year survey project. Four years ago such cooperation between industry and the EPA was unthinkable to many in government or industry.
- The survey generated improved cooperation between state regulatory agencies and industry trade associations.
- The study estimated (with more accuracy than currently available marketing studies) the number of urban pesticide applicator firms in the U.S.
- The study estimated for the first time the extremely broad range of chemicals used by the three industries involved in the survey.
- The study estimated a weighted (--scaled up) number of pounds of chemicals used per year by the three surveyed industries.
- The study provides data to estimate the professional population whose livelihood depends on employment in the three industries surveyed.
- The study indicates the relative number of firms in the U.S. that belong to professional trade organizations.
- The study indicates the trade magazines read by at least the respondents to the survey -- valuable marketing data!
- The data estimates the relative gross dollar value of the three industry firms in the U.S. In the past, we estimated economic benefits. Now we can speak with more authority because firm survey base figures for their data are better than nothing but guesses.
- The survey indicates the knowledge about product labels, or the willingness to read product labels by the respondents of the three industry firms. If survey results show that some applicators do not know the EPA

> number when they see it then the survey points out a weakness that must be addressed in training and education resources serving the industries. Our customers also deserve to know our real value as protectors of health, food, structures, and the green environment, and this survey helps provide data to do that job.

There are other positives, but the above are enough to illustrate the contributions to improved knowledge made by this nationwide data collection project.

The NUPAS survey of 1981 was a pioneering government-industry cooperative effort. As in all such initiatives one learns so that if and when done again it can be done better and more cost-effectively. The industry association participants in this project are of the opinion that individual industry practitioners should benefit from the data collected. For example, it will enable an individual to know with assurance the number of pesticide applicator firms nationwide, as well as in his multistate region, and in some instances, in his state. It will enable him to see multistate regional areas that are under or over served; it will allow individual company comparisons with regional profiles of the personnel qualifications and pesticide use practices of others in that region in the same field and the two other related fields.

The national urban pesticide applicator trade associations enabled the government, both EPA and the state regulators, to obtain information that if used properly can improve the public decision-makers' perceptions of the benefits versus the risks of pesticides used by the urban applicator industry, obtain more precise data on the quantities of pesticides used, and how, in the urban compared to agricultural areas. This should encourage more enlightened and cooperative state and federal pesticide use enforcement planning and action for protection of the general public and also the commercial applicators of pesticides -- the most highly exposed segment of the "user" community.

The NUPAS was a valuable information gathering project. All of us, whether as commercial applicators, government regulators, or homeowners will benefit to the degree we use the storehouse of information that the NUPAS data provides.

B. Association of American Pesticide Control Officials Assessments of NUPAS

ASSOCIATION OF AMERICAN PESTICIDE CONTROL OFFICIALS
ANALYSIS OF
THE NATIONAL URBAN PESTICIDE APPLICATORS SURVEY

One of the most asked questions of state pesticide regulators is--what pesticides do applicators in your state use and how much? In the vast majority of states only an "educated" guess can be made but no real data can be given to the questioner. The National Urban Pesticide Applicators Survey (NUPAS) offered a chance for states to gather statistically valid information about a major group of pesticide applicators with no cost to them. Not only would the data be reliable but it would allow states to compare usage within their regions and between different parts of the country. Hard data about the use of pesticides are difficult and costly to obtain. For this reason the Association of American Pesticide Control Officials (AAPCO) chose to participate in NUPAS.

AAPCO expected to learn what pesticides structural pest control operators and ornamental and turf applicators actually use in their businesses: what category of chemicals they were using--1) chlorinated hydrocarbons, organophosphates, carbamates, etc., 2) restricted use versus general use pesticides, and 3) proportions of insecticides, hericides, rodenticides, etc. We were also interested in what phases of the urban pest control business companies engaged in. How many did termite work along with general pest control? Did most companies offer both structural pest control and lawn and ornamental pest control? Do small one-man companies use the same chemicals used by the larger regional or national firms? How do pest control operators receive their information and training? What training do they consider to be the most valuable? Are state certification training programs effective and are they covering the needs of the industry and the problems encountered by the pest control industry? Finally, what percentage of urban applicators belong to a professional or trade association. This last is of interest to states because the trade associations often follow the comment on proposed pesticide regulations much more often than do individual applicators. States are interested in how large a percentage of applicators in their states are represented by an industry association and whether association comments represent the views of the industry in their state.

A great deal of information came out of NUPAS. Some of it was in areas not directly surveyed, but in the logistics of such a survey. It showed that EPA, the state and industry could all cooperate to conduct a successful, valid survey of benefit to all. It also demonstrated some of the limitations of a mail survey and the necessity of more communication between cooperators prior to the initiation of the survey.

AAPCO believes NUPAS gives state pesticide officials a good idea of the active ingredients used by pest control operators, what segment of the industry uses what active ingredient and the relative amounts of each active ingredient used in the ten EPA regions.

The pesticide product data also tell what formulations are used. Solvents and synergists are listed as active ingredients and if the tables are given to persons not knowledgeable about pesticide formulations it would appear that a lot more products are being used than is the case. The list of active ingredients fails to give any valid indication of the target pest(s) except in specialized cases such as the termiticides.

The data presented in this report, while useful nationally, do not provide individual states with a profile of pesticide usage within their respective state. Therefore, the question of what and how much can only be answered by inference, or by generating state-level estimates using the public user data tape. This limitation is less in more homogeneous regions such as Region 1 and greater in an area like Region 6 where states differ greatly in climate, pest incidence and population density.

To a knowledgeable state pesticide official the pesticide usage data can be interpreted and will be useful in answering questions about what is used by pest control operators and should help in planning inspection and training programs.

The gross sales information while of interest to industry groups is of less use to states. The employment figures by type of employee is information never before available to states and should be valuable in targeting information in training programs.

Table 7 on the number of certified or licensed service technicians show the tremendous educational effort which has been accomplished since 1976. It also should provide a guide for states as to the number of technicians that might remain to be certified should the number of restricted use pesticides expand or they choose to expand certification requirements within their respective state.

The survey showed the small percentage of firms which belong to the national trade associations and that this percentage is especially low among the smaller, less successful companies. It does not tell us whether or not the non-member firms have the same concerns and needs as do the member firms.

Despite the problems in gathering the data and the assumptions and manipulations made, AAPCO believes the data is valid and gives a good national picture of the pest control industry to an extent never before adequately documented. Like most statistical data it is not readily interpretable by laymen outside of the industry, but to state, federal and industry persons knowledgeable in pesticides the data gives a wealth of information not previously available.

AAPCO feels the survey data are just as valid and useful in 1984 as they were when they were collected. The objectives and use for the information are the same today as when the survey was envisioned in 1981. The states can use the survey to fine tune training programs. Inspection programs can be planned to better utilize resources. Specialized state surveys can be targeted to fill in details not addressed by NUPAS without duplicating data adequately covered by NUPAS. Besides the actual data compiled in NUPAS, the experience gained in conducting the survey should make future surveys less costly and more informative.

EPA and its staff and the staff of the Research Triangle Institute are to be complemented for tackling one of the most difficult areas of pest control and pesticide usage and delivering a useful and valid overview of the pest control industry.

C. EPA Assessment of NUPAS

United States Environmental Protection Agency
Office of Pesticides and Toxic Substances
Economic Analysis Branch
Washington, D.C. 20460

EPA's SPONSORSHIP OF THE NUPAS SURVEY

NUPAS is part of a broader initiative by the Office of Pesticide Programs to gather quantitative pesticide usage data for the urban/non-farm sector. Data on how much of and where a pesticide is used is basic to the analysis of exposure and benefits. It enables the Agency to assign priorities on the relative importance of various registered uses and to the various regions of the country. In addition to risk/benefit analysis of specific chemicals, pesticide usage data is frequently requested for the planning of major programs. Recently, for example, the EPA working group developing the National Monitoring Plan has requested detailed information on pesticide use patterns.

The NUPAS Survey is the first comprehensive data base on pesticide use by non-farm commerical applicators. The amount of information it provides is vast, both in terms of the number of chemicals represented and its national coverage. This is an additional dimension to the importance of the database to EPA. No other published data source provides this information so it fills an important data gap.

Excellent data quality was achieved in spite of the complexity involved by using state lists as the sampling frame. RTI employed statistically valid sampling techniques and respondent weighting procedures. In addition, non-sampling error was reduced to the maximum extent feasible by applying good survey procedures. Preliminary peer review has validated the accuracy of the selected estimates.

A significant spinoff from the NUPAS survey is its potential use as a sampling frame of pesticide applicators for more detailed information on pesticide use patterns. This could be very important for follow-up surveys regarding risk/benefit reviews of specific chemicals, gathering general information to guide label improvements and to target exposure monitoring.

EPA plans to integrate the NUPAS quantitative usage database with other computerized databaes on pesticide use. The public user file enables EPA to more extensively mine the data, share it with other potential users, but at the same time protect the confidentiality of individual responses.

A final benefit from this survey has been the development of an effective working relationship among the sponsors of the survey. Future data collection efforts will no doubt benefit from this relationship by it's service as a model, facilitating better survey instruments through dialogue with user groups and achieving higher response rates with the help of trade associations.

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Association of Structural Pest Control Regulatory Officials
Neil Ogg, President
All members in attendance at the 1983 annual meeting

Chemlawn Corporation
Robert W. Miller, Vice President Support Services

Consultants
Richard Carr, Urban Biosystems, Inc.
Edwin Schneider

The Davey Tree Expert Company
Donald J. Shope, Vice President and General Manager, Tree Care Services

Environmental Protection Agency
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OVERVIEW

What is NUPAS?

NUPAS is an acronym for National Urban Pesticide Applicators Survey, a study of three sectors (i.e., tree, lawn and structural) of the commercial pest control operator industry. The study was funded by the Environmental Protection Agency (EPA) and jointly sponsored by the three trade associations representing these sectors, (i.e., the National Pest Control Association (NPCA) for structural pest control, the Professional Lawn Care Association of America (PLCAA) for lawn and turf, and the National Arborist Association (NAA) for tree and ornamental care) and the American Association of Pesticide Control Officials (AAPCO) representing the state pesticide regulators. The survey represents the first effort to collect quantitative pesticide usage data and permit profiles of the size and composition of the entire industry to be made. Equally important in some ways was the fact that EPA, the trade associations and the members of the industry at large were working together to address common needs and goals.

When was the survey planned/conducted/analyzed?

Planning efforts for NUPAS began in calendar year 1981 and involved representatives of NPCA, PLCAA, NAA, and AAPCO as well as staff persons from the Economic

Analysis Branch, Office of Pesticide Programs in EPA. Survey design activities including sample design/selection and questionnaire development were completed in late March with the first mailout of questionnaires occurring on April 2, 1982. Other efforts to solicit valid responses included: industry media campaign; thank you/reminder postcard to all firms receiving first mailout; letter on AAPCO stationery to all first mailout nonrespondents urging their participation; second mailout of questionnaire to first round nonrespondents; telephone prompting of all second mailout nonrespondents as of July 31, 1982; and personal interviews for a subsample of nonrespondents to the earlier mailout/prompting efforts. Primary data collection efforts were completed by late September, 1982. The data was placed in machine readable format in October, 1982 and data edit/cleaning, sample weighting and work file construction took place through March of 1984 -- a seventeen month period. Analyses were conducted on preliminary data bases beginning as early as October 1982 and have continued through preparation of this summary report and accompanying user file.

How many firms participated in NUPAS?

A total of 2,838 firms[1] in the industry responded to the survey. The firms represented all industry

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[1] Strictly speaking, 2,838 "reporting aggregates", rather than "firms", responded to the survey. The distinction between "reporting aggregate" and "firm" is discussed in section 3.1.

sectors, regions of the country, and firm sizes and included firms belonging and not belonging to trade associations -- Table A provides further details.

How much pesticide usage data was reported?

Of the 2,838 industry firms responding to the survey instrument, 2,387 provided at least some usable quantitative pesticide usage data. In all, usage was reported for 47,134,115 lbs. of 338 active ingredients contained generically in 1,073 products. Tables B and C amply demonstrate the dimensionality of the reported usage data.

How, when and to whom will the study results be made available?

Survey results will be made available in three formats: written summaries (i.e., this report); user file (i.e., computerized file containing aggregate usage data and related characteristics of responding firms); and via special tabulations of the detailed database.[2] In addition, two volumes of technical documentation provide a detailed record of NUPAS activities as they affect realized data quality. All survey results are available to the public at cost following internal review by EPA. Prior to public release, survey sponsors will receive copies of this report, the two volumes of technical documentation, and access to the user file.

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[2] *Requests must be made to Linda Zarow, EPA Task Manager, and will be honored subject to realizing adequate safeguards on respondent confidentiality and payment for service to be rendered.*

Can individual firms be identified in either the statistical summaries or on the user file?

Respondents to NUPAS were assured that their identity would not be disclosed in any survey tabulations or user files. Only the Research Triangle Institute knows the identity of each respondent.

How well can NUPAS estimate industry characteristics based on collecting data on a sample?

NUPAS selected approximately one out of every three eligible businesses on the state licensing lists for inclusion into the initial sample. More importantly, this selection was done in accordance with a probability-based design permitting valid statistical inferences to the whole industry as well as the approximation of precision for such parameter estimates. RTI has a long standing reputation as a leader in the design and analysis of surveys of this nature. Precision of usage characteristics estimates has been reported in terms of relative standard error (rse) which is the approximate standard error of the estimate divided by the magnitude of the parameter estimate. For the top 25 active ingredients, the rse had an estimated range of 4.5% to 51.6% and an average of 19.9%. Estimates for domains (e.g., industry; EPA regions) are likely to be less precise but can be computed regardless of magnitude.

What and how do other sources of error affect NUPAS data quality?

Sampling errors quantified above only account for variation over repeated conceptual samples whereas surveys are subject to other sources of error. Specifically, four major sources of nonsampling error can be identified: firm nonresponse; item nonresponse; quality of reported usage amounts; and analytical errors.

1. Firm nonreponse.
   - NUPAS was a voluntary study and one cannot force firms to participate
   - achieved 74.6% weighted coverage (response) rate
     - understates quality of data for estimated totals since larger firms generally responded.
   - observable
2. Item nonresponse.
   - 80.3% of responding firms provided at least some usable quantitative pesticide usage data
   - impossible to observe when incomplete reporting of all products occurs
3. Quality of reported usage amount.
   - source of usage data (i.e., purchase records, service records, recall) largely determines quality
   - virtually impossible after-the-fact to quantitate, particularly for guesstimates furnished through recall for 12-month reporting period

4. Analytical.

- Includes two major components:
  - mapping of reporting aggregate to sampling frame
  - converting amounts of formulated product to amount active ingredient(s) via reported/ assigned registration number.

Such nonsampling errors potentially affect estimates of usage in two distinct ways: increase in variation among repetitions of survey (i.e., random component); and shifting of actual estimate as the result of bias (i.e., systematic component). The systematic component of nonsampling error is particularly important in establishing a baseline for usage, Unfortunately, NUPAS has no external industry profile for evaluating the potential for bias. Instead, assurances of quality are sought through comparison with manufactured amounts for major chemicals (e.g., chlordane) and in the quality and intensity of the data analysis effort. These notwithstanding, no ability exists after-the-fact to assess the potential for underreporting or overreporting of products and/or their usage amounts. Consolation must be sought in the notion that firms had little to gain or lose by doing so. Finally, the random component of nonsampling error is expected to be at least as large as the sampling component. Additional discussion on the potential impact of nonsampling error on reported measures of precision is provided in Appendix G.

How successful was NUPAS?

The following points should be made:

- NUPAS is the most comprehensive survey of the industry to date
- NUPAS established pesticide usage baseline for industry
    - recognized that database is missing parts of North Dakota and Alaska and affords only partial coverage of fumigators and right-of-way applicators
- NUPAS showed that EPA and industry can effectively work together to address common goals/needs
    - participation of industry representatives in all facets of planning, implementation and analysis
    - sharing of study strengths/weaknesses in open, unreserved fashion
    - access to all study results
- EPA demonstrated that it was willing to spend the time and money necessary to produce quality data
- NUPAS data will lead to better decisions being made than otherwise would be possible
    - related studies will benefit from experience gained
    - other characteristics (e.g., label comprehension/adequacy, applicator safety) will be addressed in follow-up efforts.

Table A

Profile of Industry Firms Participating in NUPAS

Characteristic	Categories	Distribution in Sample		Estimated Distribution in Population	
		Number[1]	%	Number[1]	%
Industry Sector	Lawn	257	9.1	1,278	7.4
	Tree	281	9.9	1,490	8.6
	Lawn and/or Tree	526	18.5	3,033	17.6
	Structural	1,409	49.6	8,814	51.1
	Structural and Tree and/or Lawn	365	12.9	2,621	15.2
	Overall	2,838	100	17,236	100
EPA Region[2]	1	208	6.9	1,054	5.9
	2	343	11.4	1,945	10.9
	3	277	9.2	1,699	9.5
	4	604	20.0	3,679	20.6
	5	503	16.7	3,000	16.8
	6	358	11.9	2,330	13.0
	7	246	8.2	1,513	8.5
	8	102	3.4	424	2.4
	9	304	10.1	1,802	10.1
	10	73	2.4	409	2.3
	Overall	3,018	100	17,855	100
Trade association affiliation	National & state/ regional	513	18.1	2,686	15.6
	National only	378	13.3	1,893	11.0
	State/regional only	456	16.1	3,185	18.5
	None	1,274	44.9	7,992	46.4
	No response	217	7.6	1,479	8.6
		2,838	100	17,236	100
Gross sales	<$25,000	828	29.2	5,223	30.3
	$25,000-$99,999	793	27.9	4,989	28.9
	$100,000-$499,999	656	23.1	3,651	21.2
	$500,000-$999,999	104	3.7	511	3.0
	$1,000,000-$5,000,000	83	2.9	380	2.2
	>$5,000,000	22	0.8	96	0.6
	No response	352	12.4	2,386	13.8
		2,838	100	17,236	100

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[1] Number of reporting aggregates in each category.

[2] Some reporting aggregates served more than one EPA region, and were counted in each region they served.

Table B

Profile of Amounts of Active Ingredients Reported in NUPAS

Characteristic	Categories	Amount Reported in Sample Pounds	Amount Reported in Sample %	Estimated Amount Used by Population Pounds	Estimated Amount Used by Population %
Industry Sector	Lawn	3,321,873	26.8	5,349,539	11.3
	Tree	878,620	7.1	2,785,257	5.9
	Lawn and/or Tree	548,593	4.4	3,294,165	7.0
	Structural	6,327,784	51.0	23,735,220	50.4
	Structural and Tree and/or Lawn	1,318,493	10.6	11,969,934	25.4
	Overall	12,395,363	100	47,134,115	100
EPA Region[2]	1	658,716	5.3	1,351,110	2.9
	2	747,388	6.0	2,555,316	5.4
	3	1,952,374	15.8	5,492,545	11.7
	4	2,019,846	16.3	9,150,868	19.4
	5	2,720,943	22.0	8,123,528	17.2
	6	1,067,779	8.6	6,479,821	13.7
	7	1,176,386	9.5	3,435,648	7.3
	8	1,012,131	8.2	3,503,826	7.4
	9	841,981	6.8	5,737,468	12.2
	10	197,818	1.6	1,303,984	2.8
	Overall	12,395,363	100	47,134,115	100

Table C

Usage Characteristics of Firms Participating in NUPAS

Characteristic	Categories	Distribution in Sample[1] Number[2]	Distribution in Sample[1] %	Estimated Distribution in Population Number[2]	Estimated Distribution in Population %
Pounds in Active Ingredient Used in 1981	<10	84	3.5	695	4.0
	10-99	415	17.4	3,107	18.0
	100-999	1,083	45.4	8,346	48.4
	1,000-9,999	690	28.9	4,454	25.8
	10,000-99.999	101	4.2	592	3.4
	>100,000	14	.6	41	0.2
		2,387	100	17,236	100
Number of Active Ingredients Used	1-5	790	33.1	6,335	36.8
	6-10	724	30.3	5,706	33.1
	11-20	579	24.3	3,894	22.6
	21-50	290	12.1	1,284	7.5
	>50	4	0.2	15	0.1
		2,387	100	17,236	100

[1] Only reporting aggregates which provided usage data are included.

[2] Number of reporting aggregates in each category.

1. INTRODUCTION

This final report on the National Urban Pesticide Applicator Survey (NUPAS) provides an overview of the survey and presents survey tabulations of general interest to pesticide regulators and the pest control industry. The survey overview is intended primarily to provide the basic background needed to understand and interpret the results presented in the tables. More detailed information on the survey is presented in two Technical Volumes which are referred to throughout this report.

The results presented in this volume were generated as part of the analysis plan agreed to by RTI, EPA, and a representative of the NPCA on February 6, 1984. Only tables thought to be of broadest interest are included in this report. A public user data tape provided to EPA by RTI will permit more detailed tables to be generated. Requests for specific analyses should be directed to Linda Zarow, EPA task manager for this survey ((703) 557-7355).

2. SURVEY DESCRIPTION

2.1 Preliminary Work

RTI's involvement with NUPAS began in January, 1982. Preliminary discussions about the survey had already occurred between EPA and four trade associations - the National Pest Control Association (NPCA), the National Arborist Association (NAA), the Professional Lawn Care Association of America (PLCAA), and the Association of American Pesticide Control Officials (AAPCO). The results of these discussions are profiled in Technical Volume I, Chapter 1.

This survey was the first to attempt to obtain national, comprehensive pesticide usage and business profile information for firms in the tree/shrub/ornamental, lawn/turf, and structural pest control sectors. Therefore, NUPAS questionnaire development and sample design had to rely on expert opinion rather than previous surveys' experience. The trade associations provided input throughout the development stages of NUPAS. Resource constraints coupled with assumptions about record keeping systems and the acceptable level of respondent burden led to a decision to use mail as the primary mode of data collection. A thorough description of the questionnaire development process is given in Technical Volume I, Chapter 3. A copy of the questionnaire is provided in Appendix A.

State regulatory lists were cited as being the most complete and accurate available sources of information on the intended target population, and were therefore chosen to serve as the bases for NUPAS sampling frame[1] construction. All states and the District of Columbia were contacted and asked to cooperate in NUPAS and provide lists of firms certified in EPA pest control categories 3a (lawn/ turf), 3b (tree/shrub/ornamental), and 7 (structural) to apply pesticides in their states. All states except North Dakota and Alaska agreed to cooperate, and provided their lists in January and February, 1982.

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[1] A sampling frame is a list of elements (e.g. people, businesses) from which a sample can be selected.

2.2 Sampling Frame Construction and Sample Selection

Upon receipt the state lists were examined for compliance with the survey's needs, and if possible the observations on the list were categorized as belonging to the outdoor pest control sector (tree, lawn, shrub, turf, and ornamental pest control), the structural pest control sector (including termite control, commodity fumigation, and general pest control), or both (see Technical Volume I, Section 2.2.2). For some states such classification required considerable amounts of interpretation. Some specializations, in particular commodity fumigation and right of way pest control, were included on lists from some states, and were not included on others. This partial coverage results in underestimation of the amounts of pesticide used by such firms.

Some states provided lists of certified applicators, whereas other states provided lists of regulated pest control firms. Because the survey was to be at the level of the firm, the individual-level lists had to be transformed into firm-level lists prior to final stage sample selection (see Technical Volume I, section 2.2.3 and 2.2.4). In the majority of the individual-level lists, information on the employer of the individual (specifically, firm name and sometimes address) was provided, and this information was used to generate firm-level lists for those states. Overall, firm-level lists were obtained or directly generated for 41 states, the District of Columbia, and the structural sector in Louisiana. Following removal of elements that were obviously not members of the target population[1], and of obvious duplicate elements within a state list, the firm-level lists were then placed in computer-accessible form in March, 1982. Further cleaning was done by searching within each state for business license or 'firm name within five digit zip code' matching and removing any duplicate records.

A sample of 8000 firms was selected from the 42 state frame, stratifying by state and industry sector (see Technical Volume I, Section 2.3.1). Sample size was allocated to achieve, to the degree possible, equal rates of sampling by industry sector subject to constraints at the state and census division level. A minimum of 5 firms per stratum were selected at random without replacement within each stratum. The first mailout to these firms was completed by April 2, 1982.

For the seven states for which a firm-level list could not be directly generated (Arizona, Louisiana (partial), Massachusetts, Nebraska, Pennsylvania, Virginia, and West Virginia), a two phase sample design was employed. Specifically, a sample of 2500 individual applicators was selected, stratified by state and industry sector. These individuals were then contacted by telephone and asked to provide the name and address of their current employer, and to assess whether or not that employer was eligible for inclusion in the NUPAS survey. Telephone screening was completed in April, 1982.

Based on the answers provided during the screening, a frame of applicators employed by firms eligible for NUPAS in the 7 "telephone" states was constructed, and a sample of 620 individuals selected, stratifying by state and an updated industry sector categorization. All eligible firms associated with the sampled individuals were then mailed a survey questionnaire. The first mailout to the firms employing these individuals was completed by April 23, 1982.

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[1] The target population is the population about which inferences are to be made.

The nature of the state lists and subsequent frame construction process led to complications in cleaning and analyzing the NUPAS data. Because of the large amount of variability between states in the nature of their lists, and in the quantity and quality of data on their lists, no attempt was made to develop a frame that had a unique entry for each pest control firm. Cleaning was only done internal to states, and then only to remove listings that matched in both name and location, or business license number. The result was that a firm with multiple locations and/or a multistate service area could appear on the frame several times, and thus could be selected several times. This potential was recognized at the time of sample selection. The intent was to deal with this possibility by 1) asking respondents to provide data only for the reference state listed on the questionnaire and 2) to use auxiliary data collected on the questionnaire to identify respondents who may have provided data for more than one frame element. Data for respondents who reported on an aggregate of frame elements were to be analyzed using multiplicity estimators[1].

2.3 Response and Data Collection

Because NUPAS was a mail survey of an industry not previously surveyed, resources were allocated for followup efforts that would increase participation in the survey (see Technical Volume I, Chapter 6). Throughout the collection period, a media campaign was conducted to encourage participation of sampled firms in NUPAS. Advertisements were run in trade journals, announcements were made at trade association meetings, and trade association personnel actively encouraged cooperation. Prompting letters from RTI were sent to first mailout nonrespondents under an AAPCO letterhead and signature by June 16, 1982. Thank you/reminder postcards were sent to all first mailout firms by June 23, 1982, and a second mailout of the questionnaire to current nonrespondents took place in the first few days of July, 1982. All sample members who had not responded by July 31, 1982 were prompted by telephone in the first two weeks of August.

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[1] The use of multiplicity estimators is a statistical technique for properly weighting the data provided by a respondent that could have been included in the sample through more than one frame element.

Because the response rate by the end of July was still not sufficiently high, a decision was made to select a sample of nonrespondents to followup with personal interviews by American Association of Retired Persons (AARP) personnel. A sample of 1320 firms was selected in early August without benefit of the telephone prompting results, and enumeration by AARP interviewers continued until mid-October, 1982.

It was apparent relatively early in the data collection period that the response rate for the sampled locations of three major pest control firms - Orkin, Chemlawn/Chemscape, and Terminix - was low. Because these three firms represent such a large portion of the pest control industry, their participation in NUPAS was considered critical if representative estimates of pesticide usage were to be produced. For this reason, the national headquarters of each of these firms was contacted and ask to provide data for their entire operation. Each of the firms complied, with the Terminix usage data provided at a branch office level. Because of the special treatment of these industry giants, the original sample was subsequently treated as a census of these three firms, and a sample of all others. This subject is treated further in Technical Volume II, Chapter 3 and Section 4.4.

The final weighted coverage rate[1] for 'nongiant' sample members was 74.6 percent. Usable quantitative pesticide usage data was provided by 80.3 percent of the eligible respondents.

2.4 Resolution of Reporting Aggregates

The auxiliary information (i.e. questions 5, 6, 7, and 8 in the mail questionnaire) provided by each respondent was examined in October and November, 1982, and those respondents who appeared to have a potential for having provided data for more than one state and/or location were identified. All of the approximately 800 such respondents were contacted by telephone in December, 1982 and January, 1983 and administered the reporting aggregate resolution questionnaire (see Technical Volume II, Appendix B). The intent of the callbacks was to determine exactly what the reporting aggregate for a particular questionnaire was; that is, what states the data (specifically, the usage data) was for, and how many locations and/or business names were reported on. Addresses and names for all business offices included in the aggregate were sought. Respondents who indicated that they served a multistate area were asked to report the percent of the firm's total business in each state. This data was subsequently used to prorate their data to state level. The industry giants who had provided national data were also recontacted and asked to provide 'percent total business by state' data.

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[1] The weighted coverage rate is the ratio of the sum of eligible respondents' basic weights to the sum of their weights adjusted for nonresponse (see Technical Volume II, Section 9.2).

The information gathered during these callbacks was then examined and used to identify the component sample members of each reporting aggregate. This identification was crucial both to properly weight the data and to avoid double counting for multiple respondents in the same reporting aggregate. The large number of weighting resolution questionnaires, coupled with respondent inconsistencies, sampling frame inaccuracies, and time lags between state list construction and reporting aggregate resolution made this a time-consuming, resource-intensive task. Some respondents had to be contacted two or more times in order to resolve problems. Final resolution of the reporting aggregates was completed in July, 1983. A more detailed description of the resolution process is provided in Technical Volume II, Section 4.3.2.

During the resolution phase, the decision was made to solicit national data from two major tree pest control companies. This action was taken in response to their prominent position in the tree pest control sector and the relatively low response rate of this sector. All necessary data was received from them by September, 1983.

2.5 Data Editing and Cleaning

Upon the return of a questionnaire to RTI, it was logged into a control system, batched, edited, and keyed into a computer file (see Technical Volume II, Chapter 2). While some logical editing was performed on the nonusage data, the primary editing effort was focused on the pesticide usage data. This effort is described thoroughly in Technical Volume II, Chapter 6. Analyses of NUPAS usage data are at the active ingredient, rather than the product, level. Accurate, efficient translation from product to active ingredient is accomplished through the product's EPA registration number. These numbers provide unique links to the EPA pesticide databases and permit transformation of reported usage amounts into pounds of active ingredients. However, a large portion of the usage data was reported without any EPA registration number, or with numbers that were subsequently found to be invalid. After initial efforts by EPA to provide registration numbers for such observations proved too time consuming, RTI staff worked on assigning registration numbers to all records, using the usage data itself as a source of information. Observations with names and formulations similar to those of observations which had registration numbers were assigned those registration numbers. Frequency of occurrence of a registration number was interpreted as being a measure of it's legitimacy, and for records which could be matched to more than one registration number based on the reported product name and formulation, the "most legitimate" registration number was assigned. This strategy effectively means that the registration numbers used in analyses are in some sense "generic", and that a potential for erroneous assignment existed. The impact of such errors on the active ingredient estimates is a function of the degree to which the assigned registration numbers differed in composition (i.e. percent active ingredient(s), by weight) from the "true" registration number.

The initial assignment of registration numbers was completed by July, 1983. Subsequent work using consultants and the RTI SAS version of the EPA pesticide databases resulted in more assignments and/or revisions in October 1983 and December 1983.

Some of the usage data was reported in units of "boxes", "cases", "drums", or other units that were not readily transformable into pounds or gallons. Many of these observations were subsequently made usable in September and October, 1983 by obtaining the necessary packaging information from product manufacturers.

2.6 Weight File Construction

A variety of complicating factors made construction of the final weight file a time-consuming, complex task, requiring many assumptions and subjective decisions. Details of the weighting process are given in Technical Volume II, Chapter 4. The raw weight files were available at the time of sample selection. The nonresponse followup sampling weights were also calculated at the time of sample selection, but, due to reporting aggregate problems and the use of "national" data for the industry giants, they had to be revised considerably prior to use. The existence of many-to-one mappings from the sample members to the reporting units was handled by using multiplicity estimators. This meant that the multiplicity, or number of frame members contained in a reporting aggregate, had to be determined for each responding sample member, and an imputed average multiplicity assigned to all nonrespondents. Nonresponse adjustments were then made, taking into account the inefficient (i.e., including ineligible members) nature of the sampling frame. Nonresponse adjustments were made at the overall questionnaire level, and, due to the sizable number of respondents who failed to provide any usage data, at a product usage level. The latter adjustment was based strictly on the presence or absence of any usage data that was transformable to pounds of active ingredients, and is used only for analyses involving the usage data.

The weight file went through several iterations as imputation and adjustment strategies and input data changed. The final version of the weight file was completed in March, 1984.

2.7 Preliminary Analyses and Review

A series of preliminary analyses were performed on the NUPAS data and distributed to select reviewers or presented at meetings, with the intent of obtaining independent assessment of the accuracy of the estimates (see Technical Volume II, Chapter 8). A presentation made to the NPCA Board of Directors in October, 1982 primarily dealt with overall and question-specific response rates. National and census region estimates of four products were generated in March, 1983 for review by Union Carbide Agricultural Products. Preliminary national and EPA region usage estimates and selected other cross-tabulations were presented at the Association of Structural Pest Control Regulatory Officials Annual Meeting in October, 1983 and to the Project Development Council of the National Pest Control Association in November, 1983. Review of preliminary usage estimates by Velsicol, several other pesticide manufacturers and industry personnel was solicited by EPA and RTI throughout the fall of 1983.

Assessments of the preliminary estimates were generally that they were low, prompting further work on usage data cleaning and examination of the estimation logic and software. Programming errors were detected in the imputation and weighting software, and some of the weighting methodology was modified to incorporate more justifiable assumptions. These changes resulted in substantial increases in many of the estimates. It should be stressed that in no way were the preliminary estimates simply adjusted up to any externally provided totals. All final estimates are based solely on data collected by NUPAS.

3.1 General

The tabulations specified in the final analysis plan are presented in Tables 1-16 and Appendices B-F. They are based on the weighted responses of 2,838 reporting aggregates represented on the master questionnaire file. These reporting aggregates were deemed to be eligible members of the target population for NUPAS, that is, firms in the tree, lawn, and structural sectors offering commercial pest control services in the 48 cooperating states and the District of Columbia in 1981, specifically excluding all firms concerned solely with commercial agriculture or golf courses. For the analyses, sample members previously categorized as tree/lawn were recategorized as tree only, lawn only, or tree and/or lawn based on their responses to the questions on industry sector and national trade association membership (see Technical Volume II, Chapter 10).

The questionnaires correspond to a weighted sum of 17,236 reporting aggregates, distributed by industry sector as follows:

Industry Sector	Weighted estimate of the number of reporting aggregates
Lawn	1,278
Tree	1,490
Tree and/or Lawn	3,033
Structural	8,814
Structural and Tree and/or Lawn	2,621

Because of the sampling frame used in this study and the nature of the response, the definition of reporting aggregate in these analyses is not obvious (see Technical Volume II, Section 9.2). Reporting aggregates in these analyses may be (1) a single office's business in a single state; (2) a single office's total business (i.e., across all states in which it does business); (3) several offices' combined business in a single state; or (4) several offices' combined business in some or all of the states they serve. Obviously, estimates involving the number of reporting aggregates need to be interpreted with care.

Both national and EPA regional totals are presented in many of the tables. The EPA regions are shown in Figure 1.

3.2 Sources of Error

The estimates in Tables 1-16 and Appendices B-F, reflect some or all of the following potential sources of error:[1]

(1) Sampling error. This is the error contribution attributable to the specific sampling design and sample sizes chosen for this survey, and will be quantified for some of the estimates in the final report.

(2) Incorrect mapping of sample units to reporting aggregates. This would result in inaccurate weights and possible erroneous inclusion or exclusion of data.

(3) Incorrect assignment of EPA registration number, leading to inaccurate conversion of reported usage into pounds of active ingredient.

(4) Respondent error in measurement of quantity of pesticide used, number of employees, etc.

(5) Respondent error due to misunderstanding of questions.

(6) Undercoverage and/or overcoverage of the target population. The former obviously occurred when firms went out of business prior to receiving the questionnaire, or were not included on the state licensing lists. The latter results from unintentional misclassification of ineligible firms as eligibles.

(7) Errors in state and region level estimates due to proration of multistate data to state level using % total business by state. To the degree that the variable under study is not distributed across the states served in the same way that the firms total business is, the proration will be in error.

(8) Subjective judgement and assumptions made during nonresponse adjustment of the weights. Distributional differences between respondents and nonrespondents result in nonresponse adjustment error.

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[1] The sources of error in (2)-(8), referred to as nonsampling error, are not quantifiable, but together are likely to be as large or larger than the sampling error.

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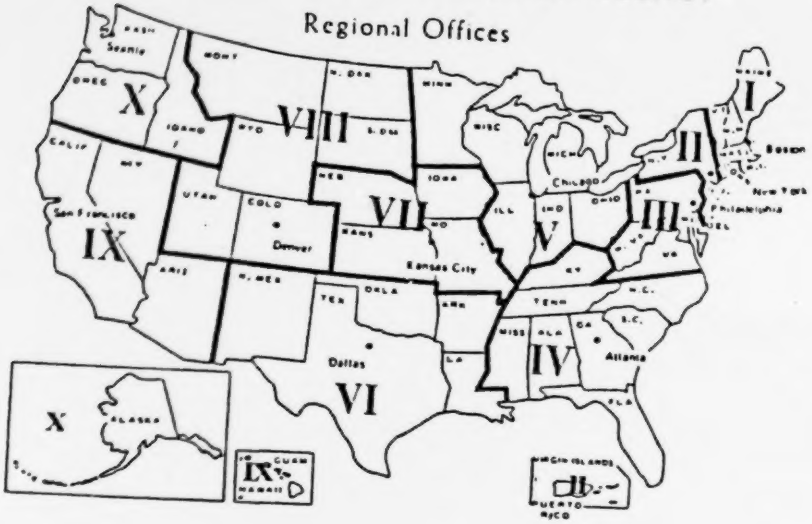
UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY

Regional Offices


Seattle
X
VIII
San Francisco
IX
Denver
VII
Kansas City
Dallas
VI
Chicago
V
IV
Atlanta
III
Philadelphia
II
New York
Boston
I
X
IX
II

REGIONS	LOCATIONS
IV	Alabama
X	Alaska
IX	Arizona
VI	Arkansas
IX	California
VIII	Colorado
I	Connecticut
III	Delaware
III	Distric of Columbia
IV	Florida
IV	Georgia
IX	Hawaii
X	Idaho
V	Illinois
V	Indiana
VII	Iowa
VII	Kansas
IV	Kentucky
VI	Louisiana
I	Maine
III	Maryland
I	Massachusetts
V	Michigan
V	Minnesota
IV	Mississippi

REGIONS	LOCATIONS
VII	Missouri
VIII	Montana
VII	Nebraska
IX	Nevada
I	New Hampshire
II	New Jersey
II	New York
IV	North Carolina
VIII	North Dakota
V	Ohio
VI	Oklahoma
X	Oregon
III	Pennsylvania
I	Rhode Island
IV	South Caroli
VIII	South Dakota
IV	Tennessee
VI	Texas
VIII	Utah
I	Vermont
III	Virginia
X	Washington
III	West Virginia
V	Wisconsin
VIII	Wyoming

IX	American Samoa
IX	Guam
II	Puerto Rico
II	Virgin Islands

Figure 1

These potential sources of error are described more thoroughly in Technical Volume II, Section 9.3. Assessment of their impact is given in Sections 9.4-9.5 of the same volume.

3.3 Table and Appendix Descriptions

The results presented in this volume can be grouped into five general categories: pesticide usage, sales information, employee information, service descriptors, and general industry profiles. The tables and appendices in each group will be described in turn. All references to specific question numbers relate to the original questionnaire (Appendix A).

3.3.1 Pesticide Usage

Estimates of the total amounts of pesticides used in 1981 by firms in the NUPAS target population are presented in Tables 1, 2, and 3 and Appendices B and C. All estimated totals are in units of pounds of active ingredient(s). Totals for an active ingredient are labelled with both the chemical name and the EPA chemical code number[1] (referred to as 'CHEMCODE' in the tables and appendices) of the active ingredient. The estimated precision of each of the totals is reported in terms of relative standard error (RSE),

$$\text{RSE} = \frac{(S_T^2)^{\frac{1}{2}}}{T} \times 100,$$

where

T = the weighted estimate of the total amount of active ingredient(s)

S_T^2 = the estimated variance of T (see Technical Volume II, Chapter 5).

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[1] This is a unique code number assigned to the active ingredient by the EPA and used to represent the active ingredient on the computerized EPA pesticide files.

The RSEs are presented in Appendices D, E, and F for the estimated totals in Tables 1, 2, and 3 respectively, and with the estimated totals in Appendices B and C. A detailed discussion of the use and interpretation of the RSEs is presented in Appendix G. The criteria used to define the product class and formulation categories in the tables are described in Technical Volume II, Section 6.6.

3.3.2 Sales Information

Tables 4 and 5 profile the responses to questions 18 and 19 respectively. The numbers in the tables represent the weighted number of reporting aggregates in each of the sales categories. The weighted number of reporting aggregates associated with respondents who did not answer the questions is given in the 'unknown' category. In both tables national totals are presented first, followed by EPA regional totals. Reporting aggregates that served more than one EPA region are represented in each region they served, at the sales level originally reported for the aggregate (i.e. not prorated to a regional level). Proration to a regional level was not possible due to the categorical nature of the questions.

3.3.3 Employee Information

Table 6 is based on the data reported in question 10. Parts a, b, and d of question 10 were summed in the 'service technicians and technical managers' category, and parts c, e, and f were summed in the 'clerical, sales, and other employees' category. If a reporting aggregate provided any usable response to any part of question 10, it was counted as having provided data. The weighted number of reporting aggregates that did not provide any usable data is also presented in the table. Under certain assumptions, the ratio of

$$\frac{\text{(the number that provided data + the number that did not provide data)}}{\text{(the number that provided data)}}$$

might be used to adjust the estimated numbers of employees upward to compensate for nonresponse in this question. The regional totals incorporate prorated numbers of employees for reporting aggregates serving more than one EPA region. The proration was based on the percent of the reporting aggregate's sales in each of the regions served (see Technical Volume II, Section 3.4, 4.3.2, and 9.3).

Table 7 is based on the response to question 11. Proration and nonresponse were handled as they were for Table 6. The complexities involved in interpreting the estimated numbers of employees in Table 7 are discussed in Technical Volume II, Section 7.2.

The weighted numbers of reporting aggregates providing given response to questions 12 and 13 are presented in Table 8. The question 13 responses are reflected under the 'Method' subheading, and are given only for those reporting aggregates that indicated that they employed people certified or licensed in states other than the reference state.

3.3.4 Service Descriptors

The number of business locations in and number of states served by reporting aggregates are profiled in Table 9. When interpreting the numbers in this table the distinction between 'reporting aggregates' and 'firms' must be taken into account. Some reporting aggregates represent only a portion of a firm's business, and so have fewer locations and/or states served than the firm as a whole does.

Profiles of the sites in which pest control services were provided are given in Tables 10a - g and 11a-g. Each segment of these tables is based on a single part of question 20. Responses to part g ('other') are not profiled due to the relatively high level of respondent misinterpretation (see Technical Volume II, Section 7.2). Prior to analysis, the percents for parts a-g of question 20 were adjusted so that they summed to 100 percent.[1] It should be noted that because of underrepresentation of right-of-way pest control firms on the sampling frame (see Section 2.2), the estimates in Tables 10F and 11F may be low.

Tables 12a-e correspond to the parts of question 21 and profile the types of services provided by the reporting aggregates. The responses to the 'other (e.g. pesticide sales)' portion of question 21 are not profiled, and the precents of all parts of the question were adjusted so that they sum to 100 percent. Because of underrepresentation of commodity fumigators in the sampling frame (see section 2.2), the estimates in Table 12D may be low.

3.3.5 General Industry Profiles

Tables 13 and 14 are based on questions 14 and 15, respectively, and present the estimated number of reporting aggregates belonging to national and regional and/or state trade associations. Responses to the question on trade magazine subscriptions (question 17) are profiled in Table 15, and the number of years the reporting aggregates had been in business as of 1981 (question 4) are represented in Table 16.

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[1] This adjustment caused some reporting aggregates to fall in the '100 percent' category in Table 10g (commercial agriculture). Only reporting aggregates that indicated that they were 100 percent agricultural prior to the adjustment were deemed to be ineligible for NUPAS analysis purposes.

Table 1. Summarized National Estimates of Pounds of Active Ingredients Used in 1981. (Relative Standard Errors Are Given in Appendix D)

	Industry Sector					
Product Class	Lawn	Tree	Tree and/or Lawn	Structural	Structural and Tree and/or Lawn	Overall
Fungicide	94,039	288,601	278,953	198,158	177,002	1,036,754
Herbicide	3,401,901	208,003	1,309,902	925,174	3,072,674	8,917,653
Insecticide	1,853,599	2,288,618	1,705,274	22,562,766	8,591,507	37,001,764
Microbicide	0	35	24	12,034	428	12,521
Vertebrate Pesticide	0	0	12	37,092	128,324	165,428
Overall	5,349,539	2,785,257	3,294,165	23,735,223	11,969,935	47,134,120

TABLE 2
NATIONAL AND REGIONAL ESTIMATES OF POUNDS OF ACTIVE INGREDIENTS USED IN 1981, BY INDUSTRY SECTOR AND PRODUCT CLASS.
(RELATIVE STANDARD ERRORS ARE GIVEN IN APPENDIX E)

INDUSTRY SECTOR=LAWN PRODUCT CLASS=FUNGICIDE

CHEMCODE	CHEMICAL	NATIONAL	REGION1	REGION2	REGION3	REGION4	REGION5	REGION6	REGION7	REGION8	REGION9	REGION10
81901	BRAVO	37594	2756	3362	7215	3827	15875	2070	1850	484	63	94
56502	PCNB	17981	383	928	745	438	14765	333	287	76	10	15
6601	PETRO. DER. AROM. HYDROCARBONS	12899	297	0	12602	0	0	0	0	0	0	0
14505	MANEB	10233	1600	5152	489	832	1935	38	175	9	1	2
99101	BENLATE	10043	932	1933	1556	621	4100	403	357	109	12	18
14504	DITHANE M-45	1711	80	0	0	1432	160	0	0	0	39	0
109801	IPRODINE	1026	164	69	195	45	398	34	30	8	81	2
79801	THIRAM	911	0	171	654	0	13	0	0	0	74	0
80811	DYRENE	437	262	13	130	0	33	0	0	0	0	0
27301	CHOLRONEB	360	0	0	0	0	360	0	0	0	0	0
0	ALL OTHERS	843	237	102	3	105	367	0	0	0	29	0
CLASS		94039	6712	11730	23591	7300	38005	2878	2700	685	309	131

INDUSTRY SECTOR=LAWN PRODUCT CLASS=HERBICIDE

CHEMCODE	CHEMICAL	NATIONAL	REGION1	REGION2	REGION3	REGION4	REGION5	REGION6	REGION7	REGION8	REGION9	REGION10
9801	BETASAN	1029546	71856	85764	114374	100505	546830	46053	47905	10428	3746	2086
78701	DACTHAL	950534	55028	76276	99471	62287	518871	47384	75401	10767	2903	2146
30019	DIETHYLAMINE 2,4-D	629922	26592	42145	50275	51859	400955	19596	30212	5874	1536	879
31519	DIMETHYLAMINE 2-(2-M-4-C)PROP.	219241	16369	17945	25235	17685	114034	11380	11527	3557	1000	509
29302	DIMETHYLAMINE DICAMBA	120272	11553	9457	8865	7716	75020	2698	3859	774	208	122
31516	DIETHANOLAMINE 2-(2-M-4-C)PRO.	98936	3256	7766	1246	6404	72756	0	4730	0	2778	0
80803	ATRAZINE	80314	389	51707	691	840	2353	338	292	77	23613	15
84301	BENEFIN	77594	2394	4269	3549	2003	61677	1218	2115	277	37	55
30016	DIETHANOLAMINE 2,4-DICHLORPHEN	52750	3038	4732	617	3171	37474	0	2342	0	1375	0
31503	POTASSIUM 2-(2-M-4-C) PROPION.	22627	180	829	3893	0	17724	0	0	0	0	0
0	ALL OTHERS	120166	5540	23491	6135	10982	30898	2604	3021	891	36504	101
CLASS		3401900	196195	324382	314349	263452	1878593	131271	181402	32645	73699	5912

INDUSTRY SECTOR=LAWN PRODUCT CLASS=INSECTICIDE

CHEMCODE	CHEMICAL	NATIONAL	REGION1	REGION2	REGION3	REGION4	REGION5	REGION6	REGION7	REGION8	REGION9	REGION10
59101	CHLORPYRIFOS	718058	14336	35107	32510	34968	566351	9729	19560	3613	1442	442
6501	AROMATIC PETROLEUM DERIVATIVE	312760	818	3613	3013	32956	268669	0	1274	260	2156	0
86803	XYLENE RANGE AROMATIC SOLVENT	253393	16555	34073	32432	20638	114763	12039	18573	3408	365	547
57801	DIAZINON	151206	10810	20070	15370	19949	61640	5026	13642	2112	2359	228
57901	TRICHLORFON	114856	5189	6598	9235	5673	58772	3872	24343	880	117	176
84001	DDVP	113107	0	8	13	505	112455	0	0	0	126	0
79101	ASPON	102572	7866	9315	13973	9005	47612	6831	5900	1553	207	311
86802	DIMETHYLBENZENE	25673	188	9032	939	6749	4496	0	3929	322	18	0
109401	ISOFENPHOS	15572	1124	2738	4230	734	5530	557	490	127	17	25
56801	CARBARYL	8970	0	3015	4675	575	705	0	0	0	0	0
0	ALL OTHERS	37432	125	421	1603	8723	21036	0	3377	0	2148	0

TABLE 2
NATIONAL AND REGIONAL ESTIMATES OF
POUNDS OF ACTIVE INGREDIENTS USED IN 1981,
BY INDUSTRY SECTOR AND PRODUCT CLASS.
(RELATIVE STANDARD ERRORS ARE GIVEN IN APPENDIX E)

-- INDUSTRY SECTOR=LAWN PRODUCT CLASS=INSECTICIDE --

CHEMCODE	CHEMICAL	NATIONAL	REGION1	REGION2	REGION3	REGION4	REGION5	REGION6	REGION7	REGION8	REGION9	REGION10
CLASS		1853599	57012	123991	117993	140475	1262027	38054	91088	12274	8956	1730
SECTOR		5349539	259918	460103	455933	411227	3178625	172203	275190	45604	82963	7773

TABLE 2
NATIONAL AND REGIONAL ESTIMATES OF POUNDS OF ACTIVE INGREDIENTS USED IN 1981, BY INDUSTRY SECTOR AND PRODUCT CLASS.
(RELATIVE STANDARD ERRORS ARE GIVEN IN APPENDIX E)

INDUSTRY SECTOR=TREE PRODUCT CLASS=FUNGICIDE

CHEMCODE	CHEMICAL	NATIONAL	REGION1	REGION2	REGION3	REGION4	REGION5	REGION6	REGION7	REGION8	REGION9	REGION10
6601	PETRO. DER. AROM. HYDROCARBONS	194817	10180	28651	36484	4349	60031	4154	49674	1295	0	0
63001	PENTACHLOROPHENOL	17639	0	0	0	0	13229	0	4410	0	0	0
99101	BENLATE	15753	1054	1354	2931	1109	5027	1001	746	36	703	1791
81301	CAPTAN	12079	848	1102	895	410	1610	0	0	0	4781	2433
77501	SULFUR	8355	0	0	765	1974	0	0	0	0	0	5615
14505	MANEB	8354	594	491	1014	539	3833	950	475	40	0	418
79801	THIRAM	7937	0	2457	5407	73	0	0	0	0	0	0
14506	ZINEB	7659	813	1126	996	187	2960	26	370	0	1182	0
44301	DODINE	2095	0	0	0	169	149	0	0	0	128	1650
23102	COPPER NAPHTHENATE	1500	0	0	0	30	1470	0	0	0	0	0
0	ALL OTHERS	12413	315	780	1941	701	2820	16	996	131	2389	2324
CLASS		288601	13805	35961	50432	9541	91129	6146	56671	1502	9183	14231

INDUSTRY SECTOR=TREE PRODUCT CLASS=HERBICIDE

CHEMCODE	CHEMICAL	NATIONAL	REGION1	REGION2	REGION3	REGION4	REGION5	REGION6	REGION7	REGION8	REGION9	REGION10
30035	TRIISOPROPANOLAMINE 2,4-D	60208	9813	17017	0	10176	23201	0	0	0	0	0
116001	TRICLOPYR	16430	2791	0	0	0	13527	0	0	0	0	113
5102	PICLORAM, TRIISOPROPANOLAMINE	15508	2528	4383	0	2621	5976	0	0	0	0	0
30063	OCTYL ESTER OF 2,4-D	11590	6430	0	0	5070	47	0	0	0	42	0
34902	FERRIC SULFATE	10468	0	0	0	0	0	0	0	0	0	10468
106701	FOSAMINE AMMONIUM	9429	21	9408	0	0	0	0	0	0	0	0
11104	SODIUM METABORATE	8108	0	0	0	8108	0	0	0	0	0	0
12301	HYVAR X	7168	0	4731	0	0	0	0	0	0	7	2429
80807	SIMAZINE	6998	0	0	0	122	1165	0	0	0	3141	2570
73301	SODIUM CHLORATE	6486	0	0	0	6486	0	0	0	0	0	0
0	ALL OTHERS	55611	4073	11949	56	12003	1868	0	7810	295	7228	10328
CLASS		208003	25656	47488	56	44587	45784	0	7810	295	10419	25907

INDUSTRY SECTOR=TREE PRODUCT CLASS=INSECTICIDE

CHEMCODE	CHEMICAL	NATIONAL	REGION1	REGION2	REGION3	REGION4	REGION5	REGION6	REGION7	REGION8	REGION9	REGION10
63503	REFINED PETROLEUM HYDROCARBONS	701845	73327	98507	192045	52388	237226	5335	19652	0	6181	17185
86802	DIMETHYLBENZENE	467104	92725	62131	62728	11078	189959	8575	9399	11241	18350	918
56801	CARBARYL	422665	199105	91654	34649	7365	48653	5954	16527	12099	5186	1273
34001	METHOXYCHLOR	165748	37156	30154	27104	950	64814	494	1850	1181	0	2044
57801	DIAZINON	147146	5948	12707	41616	5674	45546	8025	5527	2304	8057	11742
57701	MALATHION	141305	24832	28856	14779	7397	24450	2906	2500	7427	6813	21345
6501	AROMATIC PETROLEUM DERIVATIVE	66890	4692	9093	12271	2081	23464	1297	3165	7197	2652	977
10501	DICOFOL	29089	2307	2035	3259	787	10233	1140	1065	1624	3343	3296
103301	ORTHENE	26987	608	2096	2264	4014	7465	1110	3664	956	3988	821
86803	XYLENE RANGE AROMATIC SOLVENT	22945	83	40	39	1332	526	4511	279	247	0	15833
0	ALL OTHERS	96895	5124	11869	11447	4953	20963	1922	8543	1364	21405	9284

TABLE 2
NATIONAL AND REGIONAL ESTIMATES OF POUNDS OF ACTIVE INGREDIENTS USED IN 1981, BY INDUSTRY SECTOR AND PRODUCT CLASS.
(RELATIVE STANDARD ERRORS ARE GIVEN IN APPENDIX E)

INDUSTRY SECTOR=TREE PRODUCT CLASS=INSECTICIDE

CHEMCODE	CHEMICAL	NATIONAL	REGION1	REGION2	REGION3	REGION4	REGION5	REGION6	REGION7	REGION8	REGION9	REGION10
CLASS		2288618	445906	349162	402202	98221	673298	41269	72170	45641	75975	84774

INDUSTRY SECTOR=TREE PRODUCT CLASS=MICROBICIDE

CHEMCODE	CHEMICAL	NATIONAL	REGION1	REGION2	REGION3	REGION4	REGION5	REGION6	REGION7	REGION8	REGION9	REGION10
14701	CALCIUM HYPOCHLORITE	35	0	0	0	0	35	0	0	0	0	0
SECTOR		2785257	485367	432611	452690	152349	810246	47416	136651	47438	95577	124911

TABLE 2
NATIONAL AND REGIONAL ESTIMATES OF POUNDS OF ACTIVE INGREDIENTS USED IN 1981, BY INDUSTRY SECTOR AND PRODUCT CLASS.
(RELATIVE STANDARD ERRORS ARE GIVEN IN APPENDIX E)

INDUSTRY SECTOR=TREE AND/OR LAWN PRODUCT CLASS=FUNGICIDE

CHEMCODE	CHEMICAL	NATIONAL	REGION1	REGION2	REGION3	REGION4	REGION5	REGION6	REGION7	REGION8	REGION9	REGION10
6601	PETRO. DER. AROM. HYDROCARBONS	215437	0	105494	18662	426	13572	3438	1855	47	24	71919
99101	BENLATE	12685	94	4830	920	564	4403	569	575	6	308	418
14505	MANEB	11866	0	1246	5882	1333	3383	22	0	0	0	0
76702	CALCIUM POLYSULFIDE	3944	0	0	0	437	3493	0	15	0	0	0
79801	THIRAM	3805	0	1921	0	22	1861	0	0	0	0	0
81901	BRAVO	3228	0	102	152	521	401	85	169	0	1745	52
14504	DITHANE M-45	3099	145	0	158	1298	0	0	1007	0	491	0
81301	CAPTAN	3089	160	494	693	83	243	0	425	0	607	383
14506	ZINEB	3039	0	2593	237	60	87	55	7	0	0	0
8101	BASIC COPPER SULFATE	2897	0	40	0	110	27	0	316	0	2251	154
0	ALL OTHERS	15864	469	1749	1677	980	2239	847	687	0	5531	1684
CLASS		278953	868	118471	28382	5833	29708	5016	5055	53	10956	74610

INDUSTRY SECTOR=TREE AND/OR LAWN PRODUCT CLASS=HERBICIDE

CHEMCODE	CHEMICAL	NATIONAL	REGION1	REGION2	REGION3	REGION4	REGION5	REGION6	REGION7	REGION8	REGION9	REGION10
9801	BETASAN	220463	791	15958	78208	4256	86598	11036	21985	330	1302	0
30019	DIETHYLAMINE 2,4-D	180801	1444	12312	25522	5467	66485	12218	15295	38968	968	2121
90501	ALACHLOR	112345	0	0	0	0	174	0	0	112170	0	0
108801	METOLACHLOR	107445	0	0	0	0	0	0	0	107445	0	0
30056	BUTYL 2,4-D	81464	0	0	0	135	0	0	0	81330	0	0
24401	COPPER SULFATE PENTAHYDRATE	68555	309	67645	0	0	0	0	0	0	0	601
32201	DIQUAT DIBROMIDE	64527	0	60421	0	14	14	0	0	0	4006	72
80807	SIMAZINE	47823	102	27	2	1083	12300	7823	3140	71	21603	1671
38904	ENDOTHALL, DIPOTASSIUM SALT OF	45986	0	45986	0	0	0	0	0	0	0	0
78701	DACTHAL	43807	36	7563	3334	257	24064	562	3164	214	0	4612
0	ALL OTHERS	336686	3487	18462	40918	21747	107168	17754	25095	12698	66105	23253
CLASS		1309902	6169	228374	147984	32959	296804	49392	68679	353227	93984	32330

INDUSTRY SECTOR=TREE AND/OR LAWN PRODUCT CLASS=INSECTICIDE

CHEMCODE	CHEMICAL	NATIONAL	REGION1	REGION2	REGION3	REGION4	REGION5	REGION6	REGION7	REGION8	REGION9	REGION10
63503	REFINED PETROLEUM HYDROCARBONS	565104	789	41258	27917	44883	41486	18200	1368	48	389143	12
57801	DIAZINON	227623	1563	5928	61116	11618	86886	4691	35255	6730	3122	10713
6501	AROMATIC PETROLEUM DERIVATIVE	199148	1504	9480	92271	23557	56865	3950	2844	1234	2773	4671
86802	DIMETHYLBENZENE	181433	29141	23732	10474	17919	27783	27550	30491	3628	9194	1521
56801	CARBARYL	102702	12703	32508	5003	4199	14082	7000	10050	9491	2318	5349
57701	MALATHION	67394	1938	22023	6699	12619	10770	3915	3858	1824	3533	215
59101	CHLORPYRIFOS	56066	656	7595	11579	9446	14487	871	9374	107	1591	360
86803	XYLENE RANGE AROMATIC SOLVENT	42039	532	4153	9891	5595	10585	39	9774	0	1470	0
57201	THIMET	35743	0	0	0	0	0	0	0	35743	0	0
34001	METHOXYCHLOR	32415	12923	7496	2848	50	5475	16	3580	0	26	0
0	ALL OTHERS	195608	3465	33178	17355	28244	33567	18442	12100	7629	27988	13639

TABLE 2
NATIONAL AND REGIONAL ESTIMATES OF POUNDS OF ACTIVE INGREDIENTS USED IN 1981, BY INDUSTRY SECTOR AND PRODUCT CLASS.
(RELATIVE STANDARD ERRORS ARE GIVEN IN APPENDIX E)

INDUSTRY SECTOR=TREE AND/OR LAWN PRODUCT CLASS=INSECTICIDE

CHEMCODE	CHEMICAL	NATIONAL	REGION1	REGION2	REGION3	REGION4	REGION5	REGION6	REGION7	REGION8	REGION9	REGION10
CLASS		1705274	65214	187351	245152	158129	301986	84674	118694	66435	441159	36480

INDUSTRY SECTOR=TREE AND/OR LAWN PRODUCT CLASS=MICROBICIDE

CHEMCODE	CHEMICAL	NATIONAL	REGION1	REGION2	REGION3	REGION4	REGION5	REGION6	REGION7	REGION8	REGION9	REGION10
69149	DIDECYL DIMETHYL AMMONIUM CL	14	0	0	3	0	10	0	0	0	0	0
39107	TETRASODIUM EDTA	6	0	0	1	0	5	0	0	0	0	0
73506	SODIUM CARBONATE	3	0	0	1	0	2	0	0	0	0	0
72604	SODIUM METASILICATE	2	0	0	0	0	1	0	0	0	0	0
CLASS		24	0	0	5	0	19	0	0	0	0	0

INDUSTRY SECTOR=TREE AND/OR LAWN PRODUCT CLASS=VERTEBRATE PESTICIDE

CHEMCODE	CHEMICAL	NATIONAL	REGION1	REGION2	REGION3	REGION4	REGION5	REGION6	REGION7	REGION8	REGION9	REGION10
88601	ZINC PHOSPHIDE	9	0	0	0	0	9	0	0	0	0	0
76901	STRYCHNINE	2	0	0	0	0	0	0	0	0	2	0
CLASS		12	0	0	0	0	9	0	0	0	2	0
SECTOR		3294165	72251	534196	421524	196921	628526	139082	192428	419715	546101	143420

TABLE 2
NATIONAL AND REGIONAL ESTIMATES OF POUNDS OF ACTIVE INGREDIENTS USED IN 1981, BY INDUSTRY SECTOR AND PRODUCT CLASS.
(RELATIVE STANDARD ERRORS ARE GIVEN IN APPENDIX E)

INDUSTRY SECTOR=STRUCTURAL PRODUCT CLASS=FUNGICIDE

CHEMCODE	CHEMICAL	NATIONAL	REGION1	REGION2	REGION3	REGION4	REGION5	REGION6	REGION7	REGION8	REGION9	REGION10
63503	REFINED PETROLEUM HYDROCARBONS	90655	15	0	820	4809	52	1115	312	0	83319	215
63001	PENTACHLOROPHENOL	56611	0	59	0	608	79	0	0	0	55601	264
23102	COPPER NAPHTHENATE	26278	17	0	937	5278	0	1274	356	0	18349	67
14506	ZINEB	10631	0	213	10418	0	0	0	0	0	0	0
77501	SULFUR	5401	0	0	44	0	0	0	0	0	5356	0
99101	BENLATE	3564	0	68	3334	0	0	5	19	0	114	24
6601	PETRO. DER. AROM. HYDROCARBONS	2025	0	0	0	2004	0	0	0	0	21	0
23104	COPPER SALTS OF ACIDS	853	0	0	0	0	0	0	853	0	0	0
81601	FOLPET	655	0	0	0	0	0	0	0	0	0	655
33901	DIACETONE ALCOHOL	520	0	0	0	0	0	0	0	0	520	0
0	ALL OTHERS	964	0	0	23	408	0	12	39	0	437	45
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CLASS		198158	31	341	15578	13107	131	2405	1579	0	163717	1270

INDUSTRY SECTOR=STRUCTURAL PRODUCT CLASS=HERBICIDE

CHEMCODE	CHEMICAL	NATIONAL	REGION1	REGION2	REGION3	REGION4	REGION5	REGION6	REGION7	REGION8	REGION9	REGION10
30035	TRIISOPROPANOLAMINE 2,4-D	181634	0	0	0	181634	0	0	0	0	0	0
80803	ATRAZINE	95818	0	0	85973	0	9001	45	323	4	473	0
80807	SIMAZINE	90979	0	0	51683	0	380	197	26839	16	11864	0
30056	BUTYL 2,4-D	57245	0	0	19101	0	0	2065	14974	21104	0	0
5102	PICLORAM, TRIISOPROPANOLAMINE	46785	0	0	0	46785	0	0	0	0	0	0
35505	DIURON	45056	0	0	8390	0	0	12275	23648	557	186	0
30019	DIETHYLAMINE 2,4-D	42616	0	0	340	0	9	0	714	12244	0	29309
30053	BUTOXYETHYL 2,4-D	38300	1	0	0	38299	0	0	0	0	0	0
9801	BETASAN	37754	0	749	36682	0	0	0	324	0	0	0
31453	BUTOXYETHYL 2-(2,4-D) PROPION.	37612	1	0	0	37611	0	0	0	0	0	0
0	ALL OTHERS	251375	423	712	103164	1203	12759	16338	104721	3833	7526	696
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CLASS		925174	424	1461	305333	305532	22149	30920	171543	37757	20048	30006

INDUSTRY SECTOR=STRUCTURAL PRODUCT CLASS=INSECTICIDE

CHEMCODE	CHEMICAL	NATIONAL	REGION1	REGION2	REGION3	REGION4	REGION5	REGION6	REGION7	REGION8	REGION9	REGION10
63503	REFINED PETROLEUM HYDROCARBONS	4155907	66612	159161	2238469	845607	246700	232536	105322	15756	132686	113059
58201	CHLORDANE	3034365	87816	333156	475039	878644	298356	366437	245430	24054	294890	30543
42003	ETHYLENE DICHLORIDE	2756096	0	0	0	5	355	35	1024406	1724022	0	7274
78003	SULFURYL FLUORIDE	2309439	0	434	7852	72392	3213	25255	1057	130	2198249	857
6501	AROMATIC PETROLEUM DERIVATIVE	1952373	27965	63614	157904	648712	198763	399886	112120	12586	318510	12312
16501	CARBON TETRACHLORIDE	1169590	0	0	0	2	746	15	434500	731242	0	3085
86803	XYLENE RANGE AROMATIC SOLVENT	1007175	15182	52650	84948	380032	71581	99773	76697	4414	219811	2087
53201	METHYL BROMIDE	992703	50	8641	151342	112031	67817	74363	12870	6483	466798	92306
44801	HEPTACHLOR	971263	0	40980	77494	476974	77050	118222	72594	2937	102137	2874
57801	DIAZINON	739677	11345	49070	94316	239228	52847	112220	19593	11340	130926	18791
0	ALL OTHERS	3474178	74971	144592	299544	953117	332429	487431	368571	274509	512735	26280
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TABLE 2
NATIONAL AND REGIONAL ESTIMATES OF POUNDS OF ACTIVE INGREDIENTS USED IN 1981, BY INDUSTRY SECTOR AND PRODUCT CLASS.
(RELATIVE STANDARD ERRORS ARE GIVEN IN APPENDIX E)

INDUSTRY SECTOR=STRUCTURAL PRODUCT CLASS=INSECTICIDE

CHEMCODE	CHEMICAL	NATIONAL	REGION1	REGION2	REGION3	REGION4	REGION5	REGION6	REGION7	REGION8	REGION9	REGION10
CLASS		22562765	283940	852298	3586907	4606746	1349856	1916173	2473162	2807472	4376742	309468

INDUSTRY SECTOR=STRUCTURAL PRODUCT CLASS=MICROBICIDE

CHEMCODE	CHEMICAL	NATIONAL	REGION1	REGION2	REGION3	REGION4	REGION5	REGION6	REGION7	REGION8	REGION9	REGION10
67002	PINE OIL	4422	131	1007	121	692	1286	172	810	125	2	76
1501	ETHYL ALCOHOL	1610	0	10	209	623	290	281	91	13	82	12
46901	BUTOXY...ETHOXYETHANOL-IODINE	1587	0	0	0	0	0	0	0	0	1587	0
79009	SOAP	847	16	126	15	4	539	21	101	16	0	10
22101	CRESYLIC ACID, COAL TAR ACIDS	821	0	0	0	0	821	0	0	0	0	0
83501	TRIETHYLENE GLYCOL	818	0	5	105	313	147	149	46	6	42	6
69129	HYAMINE 2389	757	0	0	0	757	0	0	0	0	0	0
47501	PROPANOL	737	0	0	0	721	0	16	0	0	0	0
68604	DIFROPYLENE GLYCOL	201	0	1	26	78	36	35	11	2	10	1
76406	TRISODIUM PHOSPHATE	63	0	0	0	63	0	0	0	0	0	0
0	ALL OTHERS	170	0	0	9	30	56	19	4	0	51	0
CLASS		12033	149	1149	484	3280	3174	692	1064	162	1774	105

INDUSTRY SECTOR=STRUCTURAL PRODUCT CLASS=VERTEBRATE PESTICIDE

CHEMCODE	CHEMICAL	NATIONAL	REGION1	REGION2	REGION3	REGION4	REGION5	REGION6	REGION7	REGION8	REGION9	REGION10
11402	POLYBUTENE	15482	625	259	1399	7099	2817	802	1013	1156	282	31
88601	ZINC PHOSPHIDE	6885	38	32	1902	455	893	841	57	70	98	2498
63503	REFINED PETROLEUM HYDROCARBONS	5791	79	36	1012	3170	659	66	678	0	84	8
11403	POLYISOBUTYLENE	4637	9	846	267	1075	1574	843	23	0	0	0
86002	WARFARIN	2524	27	122	2198	41	11	2	1	0	0	122
67707	CHLOROPHACINONE	205	10	51	55	6	20	6	36	18	2	0
63502	MINERAL OIL, SEAL OR WHITE	201	20	181	0	0	0	0	0	0	0	0
69201	AMINOPYRIDINE	170	1	1	5	11	110	15	19	3	6	1
41601	ENDRIN	160	0	1	2	15	98	4	31	8	1	0
75003	SODIUM FLUOROACETATE	149	0	0	0	0	0	81	1	3	0	64
0	ALL OTHERS	887	11	27	58	135	126	249	167	32	22	61
CLASS		37091	819	1556	6898	12008	6309	2909	2024	1290	494	2784
SECTOR		23735220	285364	856805	3915201	4940673	1381619	1953099	2649371	2846680	4562775	343633

TABLE 2
NATIONAL AND REGIONAL ESTIMATES OF POUNDS OF ACTIVE INGREDIENTS USED IN 1981, BY INDUSTRY SECTOR AND PRODUCT CLASS.
(RELATIVE STANDARD ERRORS ARE GIVEN IN APPENDIX E)

--------------------------- INDUSTRY SECTOR=STRUCTURAL AND TREE AND/OR LAWN PRODUCT CLASS=FUNGICIDE ---------------------------

CHEMCODE	CHEMICAL	NATIONAL	REGION1	REGION2	REGION3	REGION4	REGION5	REGION6	REGION7	REGION8	REGION9	REGION10
6601	PETRO. DER. AROM. HYDROCARBONS	112787	1161	32620	36720	5463	3548	15165	0	126	0	17983
14506	ZINEB	12824	1892	163	8739	229	388	0	188	633	31	561
81901	BRAVO	6641	0	0	0	1328	407	634	0	1632	2639	0
39003	METAM-SODIUM	5612	11	6	19	9	6	0	0	0	5561	0
81301	CAPTAN	5500	214	685	799	63	729	138	125	8	551	2188
14504	DITHANE M-45	5022	37	0	0	2433	0	0	44	0	1935	574
99101	BENLATE	4136	99	242	575	433	938	625	0	47	480	696
34805	ZIRAM	3518	0	0	0	0	0	0	0	0	0	3518
6902	SODIUM POLYSULFIDE	2850	0	0	0	0	0	0	0	2850	0	0
44301	DODINE	2518	0	0	0	0	0	0	0	0	0	2518
0	ALL OTHERS	15593	222	169	10	5764	2455	3419	774	356	1742	682
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CLASS		177002	3636	33884	46863	15723	8472	19981	1131	5653	12938	28722

--------------------------- INDUSTRY SECTOR=STRUCTURAL AND TREE AND/OR LAWN PRODUCT CLASS=HERBICIDE ---------------------------

CHEMCODE	CHEMICAL	NATIONAL	REGION1	REGION2	REGION3	REGION4	REGION5	REGION6	REGION7	REGION8	REGION9	REGION10
80803	ATRAZINE	842395	0	0	0	0	0	762839	0	12036	54483	13036
35505	DIURON	392742	0	5649	8473	0	0	350204	253	0	22669	5492
12301	HYVAR X	347199	0	4237	6355	44	0	331157	169	0	2083	3154
11104	SODIUM METABORATE	318873	0	0	0	10510	0	305135	0	46	3182	0
73301	SODIUM CHLORATE	258337	0	0	0	8408	0	244108	0	37	5783	0
30019	DIETHYLAMINE 2,4-D	177411	0	125	1287	8233	5725	16727	6054	30392	9229	99638
80804	PROMETON	95281	0	121	832	1616	1722	85003	0	5	3555	2428
9801	BETASAN	76015	39	504	0	14339	5650	47091	8076	265	51	0
38904	ENDOTHALL, DIPOTASSIUM SALT OF	69607	4938	0	0	64668	0	0	0	0	0	0
30053	BUTOXYETHYL 2,4-D	65472	3	0	806	64180	0	0	0	0	0	483
0	ALL OTHERS	429344	6221	8846	3094	125955	41201	79615	6285	22823	39859	95444
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CLASS		3072674	11202	19482	20847	297953	54298	2221881	20838	65604	140895	219675

--------------------------- INDUSTRY SECTOR=STRUCTURAL AND TREE AND/OR LAWN PRODUCT CLASS=INSECTICIDE ---------------------------

CHEMCODE	CHEMICAL	NATIONAL	REGION1	REGION2	REGION3	REGION4	REGION5	REGION6	REGION7	REGION8	REGION9	REGION10
86802	DIMETHYLBENZENE	2067583	81844	67514	62954	110448	1405383	256615	2912	6993	45408	27513
6501	AROMATIC PETROLEUM DERIVATIVE	756567	7587	4754	2343	496783	13855	164427	6433	6421	28633	25331
63503	REFINED PETROLEUM HYDROCARBONS	666346	42417	28837	31769	329277	44643	132492	11021	8764	13502	23624
53201	METHYL BROMIDE	610565	0	0	0	590033	0	217	0	2	20211	102
34001	METHOXYCHLOR	585652	29160	23848	18976	10786	489136	2613	62	0	0	11070
58201	CHLORDANE	578257	386	42376	4181	214320	22980	209078	60791	8135	10180	5830
42003	ETHYLENE DICHLORIDE	416939	0	0	0	0	47	232453	54	0	0	184385
57801	DIAZINON	396039	3478	2834	9708	183955	5948	127447	4372	9426	32176	16695
78003	SULFURYL FLUORIDE	378886	0	0	0	318494	0	8519	0	0	51873	0
59101	CHLORPYRIFOS	280446	884	1824	205	202528	8851	46381	7163	2725	8532	1354
0	ALL OTHERS	1854225	67615	46190	49353	678134	70495	619380	67230	30646	85253	139928
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TABLE 2
NATIONAL AND REGIONAL ESTIMATES OF POUNDS OF ACTIVE INGREDIENTS USED IN 1981, BY INDUSTRY SECTOR AND PRODUCT CLASS.
(RELATIVE STANDARD ERRORS ARE GIVEN IN APPENDIX E)

INDUSTRY SECTOR=STRUCTURAL AND TREE AND/OR LAWN PRODUCT CLASS=INSECTICIDE

CHEMCODE	CHEMICAL	NATIONAL	REGION1	REGION2	REGION3	REGION4	REGION5	REGION6	REGION7	REGION8	REGION9	REGION10
CLASS		8591506	233372	218178	179488	3134756	2061339	1799622	160039	73111	295768	435832

INDUSTRY SECTOR=STRUCTURAL AND TREE AND/OR LAWN PRODUCT CLASS=MICROBICIDE

CHEMCODE	CHEMICAL	NATIONAL	REGION1	REGION2	REGION3	REGION4	REGION5	REGION6	REGION7	REGION8	REGION9	REGION10
69153	ALKYL TRIMETHYL NH4 BROMIDE	293	0	0	0	293	0	0	0	0	0	0
69104	BTC 776 OR 824	47	0	0	0	0	0	0	0	0	46	0
69154	ALKYLDIMETHYLETHYLBENZYL NH4CL	47	0	0	0	0	0	0	0	0	46	0
83501	TRIETHYLENE GLYCOL	21	0	0	0	21	0	0	0	0	0	0
68603	FROPYLENE GLYCOL	20	0	0	0	20	0	0	0	0	0	0
CLASS		428	0	0	0	335	0	0	0	0	92	0

INDUSTRY SECTOR=STRUCTURAL AND TREE AND/OR LAWN PRODUCT CLASS=VERTEBRATE PESTICIDE

CHEMCODE	CHEMICAL	NATIONAL	REGION1	REGION2	REGION3	REGION4	REGION5	REGION6	REGION7	REGION8	REGION9	REGION10
11402	POLYBUTENE	123703	0	56	0	356	244	123047	0	0	0	0
11403	POLYISOBUTYLENE	4107	0	0	0	387	26	3420	0	0	274	0
67704	PIVAL, SODIUM SALT OF	127	0	0	0	127	0	0	0	0	0	0
88601	ZINC PHOSPHIDE	71	0	0	0	45	0	4	0	18	1	2
41601	ENDRIN	66	0	0	0	0	58	0	0	0	0	8
86001	FUMARIN	56	0	0	0	0	0	3	0	0	54	0
56704	TOBACCO DUST	50	0	0	0	0	50	0	0	0	0	0
80501	TOXAPHENE	18	0	0	0	0	0	18	0	0	0	0
63503	REFINED PETROLEUM HYDROCARBONS	17	0	0	0	0	0	17	0	0	0	0
69201	AMINOPYRIDINE	16	0	0	0	3	0	11	0	0	0	2
0	ALL OTHERS	92	0	1	0	13	24	19	0	2	28	4
CLASS		128324	0	57	0	931	402	126538	1	20	357	17
SECTOR		11969934	248210	271601	247197	3449698	2124512	4168021	182008	144389	450051	684246
		47134115	1351110	2555316	5492545	9150868	8123528	6479821	3435648	3503826	5737468	1303984

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TABLE 3
ESTIMATES OF NATIONAL USAGE OF ACTIVE INGREDIENTS IN 1981, BY PRODUCT CLASS AND FORMULATION.
(RELATIVE STANDARD ERRORS ARE GIVEN IN APPENDIX F)

---------- PRODUCT CLASS=FUNGICIDE FORMULATION=DUST ----------

CHEMCODE	CHEMICAL	POUNDS
56502	PCNB	3413
77501	SULFUR	1534
79801	THIRAM (TETRAMETHTLTHIURAM DISULFIDE)	73
43401	ACTIDIONE	60
6310	STREPTOMYCIN SULFATE	19
34801	FERBAM	18
44301	DODINE (DODECYLGUANIDINE ACETATE)	9
FORM		5126

---------- PRODUCT CLASS=FUNGICIDE FORMULATION=GRANULAR/PELLETED ----------

CHEMCODE	CHEMICAL	POUNDS
56502	PCNB	14759
81901	BRAVO	494
27301	CHOLRONEB	360
102001	METHYL THIOPHANATE	301
99101	BENLATE	208
109901	TRIADIMEFON	50
109801	IPRODINE	27
FORM		16199

---------- PRODUCT CLASS=FUNGICIDE FORMULATION=LIQUID CONCENTRATE ----------

CHEMCODE	CHEMICAL	POUNDS
81901	BRAVO	40429
14505	MANEB	31990
23102	COPPER NAPHTHENATE	31257
63503	REFINED PETROLEUM HYDROCARBONS	27505
39003	METAM-SODIUM	7056
76702	CALCIUM POLYSULFIDE	4975
6902	SODIUM POLYSULFIDE	4074
23104	COPPER SALTS OF FATTY AND ROSIN ACIDS	2253
60102	HYPOPHOSPHOROUS 2-(4-THIAZOLYL)BENZIMIDA	1294
64104	SODIUM OTRHOPHENYLPHENATE	1029
0	ALL OTHERS	5478
FORM		157340

TABLE 3
ESTIMATES OF NATIONAL USAGE OF ACTIVE INGREDIENTS IN 1981, BY PRODUCT CLASS AND FORMULATION.
(RELATIVE STANDARD ERRORS ARE GIVEN IN APPENDIX F)

PRODUCT CLASS=FUNGICIDE FORMULATION=OTHER

CHEMCODE	CHEMICAL	POUNDS
6601	PETROLEUM DERIVED AROMATIC HYDROCARBONS	537965
63001	PENTACHLOROPHENOL	74250
63503	REFINED PETROLEUM HYDROCARBONS	67662
33901	DIACETONE ALCOHOL	520
63005	SODIUM TETRACHLOROPHENATES	62
63003	SODIUM PENTACHLOROPHENATE	38
FORM		680496

PRODUCT CLASS=FUNGICIDE FORMULATION=READY-TO-USE SOLUTION

CHEMCODE	CHEMICAL	POUNDS
77702	PROPIONIC ACID	918
99102	LIGNASAN BLP	470
FORM		1388

PRODUCT CLASS=FUNGICIDE FORMULATION=WETTABLE POWDER

CHEMCODE	CHEMICAL	POUNDS
99101	BENLATE	45974
14506	ZINEB	34154
81301	CAPTAN	20882
79801	THIRAM (TETRAMETHTLTHIURAM DISULFIDE)	14025
77501	SULFUR	12444
14504	EBDC, AS A COORDINATION PRODUCT	11014
81901	BRAVO	6839
44301	DODINE (DODECYLGUANIDINE ACETATE)	5409
34805	ZIRAM (ZINC DIMETHYL DITHIOCARBAMATE)	4615
8101	BASIC COPPER SULFATE	3404
0	ALL OTHERS	17443
FORM		176204
CLASS		1036753

PRODUCT CLASS=HERBICIDE FORMULATION=DUST

CHEMCODE	CHEMICAL	POUNDS
28902	DALAPON, SODIUM SALT OF	1394
36601	DIPHENAMID	893
FORM		2287

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                                     TABLE 3
               ESTIMATES OF NATIONAL USAGE OF ACTIVE INGREDIENTS IN 1981,
                        BY PRODUCT CLASS AND FORMULATION.
                  (RELATIVE STANDARD ERRORS ARE GIVEN IN APPENDIX F)

------------------------------------ PRODUCT CLASS=HERBICIDE   FORMULATION=GRANULAR/PELLETED ------------------------------------

                 CHEMCODE     CHEMICAL                              POUNDS

                    11104     SODIUM METABORATE                     328721
                    73301     SODIUM CHLORATE                       262977
                    84301     BENEFIN                                71028
                    80807     SIMAZINE                               43649
                     9801     BETASAN                                34586
                    80804     PROMETON                               32872
                    78701     DACTHAL                                15206
                    27401     DICHLOROBENZONITRILE                   12190
                    63003     SODIUM PENTACHLOROPHENATE               5817
                    38904     ENDOTHALL, DIPOTASSIUM SALT OF          3844
                        0     ALL OTHERS                             15501
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                 FORM                                               826391

------------------------------------ PRODUCT CLASS=HERBICIDE   FORMULATION=LIQUID CONCENTRATE ------------------------------------

             CHEMCODE     CHEMICAL                                      POUNDS

                 9801     BETASAN                                      1329193
                30019     DIETHYLAMINE 2,4-DICHLOROPHENOXYACETATE      1032616
                31519     DIMETHYLAMINE 2-(2-METHYL-4-CHLOROPHENOX      262416
                30035     TRIISOPROPANOLAMINE 2,4-DICHLOROPHENOXYA      242335
                29802     DIMETHYLAMINE DICAMBA                         158305
               103801     METOLACHLOR                                   142516
                90501     ALACHLOR                                      140247
                30056     BUTYL 2,4-DICHLOROPHENOXYACETATE              138960
                31516     DIETHANOLAMINE 2-(2-METHYL-4-CHLOROPHENO      121980
                30053     BUTOXYETHYL 2,4-DICHLOROPHENOXYACETATE        119958
                    0     ALL OTHERS                                   1140365
             ---------                                                 -------
             FORM                                                      4828891

------------------------------------------ PRODUCT CLASS=HERBICIDE   FORMULATION=OTHER ------------------------------------------

                 CHEMCODE     CHEMICAL                              POUNDS

                    30501     MCPA                                   10443
                    19201     MCPB                                   10245
                     5501     AMMATE                                  6106
                    63503     REFINED PETROLEUM HYDROCARBONS           605
                 ---------                                           -----
                 FORM                                                27400
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TABLE 3
ESTIMATES OF NATIONAL USAGE OF ACTIVE INGREDIENTS IN 1981, BY PRODUCT CLASS AND FORMULATION.
(RELATIVE STANDARD ERRORS ARE GIVEN IN APPENDIX F)

-- PRODUCT CLASS=HERBICIDE   FORMULATION=PRESSURIZED --

CHEMCODE	CHEMICAL	POUNDS
4401	AMITROLE (3-AMINO-S-TRIAZOLE)	54
98801	CHLORFLURENOL	1
FORM		55

---------------------------------- PRODUCT CLASS=HERBICIDE   FORMULATION=READY-TO-USE SOLUTION ----------------------------------

CHEMCODE	CHEMICAL	POUNDS
38905	ENDOTHALL	4059
107201	VELPAR	784
12502	SODIUM CACODYLATE	4
13803	MONOSODIUM METHANEARSONATE	1
12501	CACODYLIC ACID	1
FORM		4849

-------------------------------------- PRODUCT CLASS=HERBICIDE   FORMULATION=WETTABLE POWDER --------------------------------------

CHEMCODE	CHEMICAL	POUNDS
78701	DACTHAL	1011247
80803	ATRAZINE	1007438
35505	DIURON	460133
12301	HYVAR X	408951
80807	SIMAZINE	129156
80804	PROMETON	79008
105501	TEBUTHIURON	48703
104201	SURFLAN	38107
35509	SIDURON	22455
101701	PRONAMIDE	10072
0	ALL OTHERS	12510
FORM		3227781
CLASS		8917653

-- PRODUCT CLASS=INSECTICIDE   FORMULATION=DUST --

CHEMCODE	CHEMICAL	POUNDS
11001	BORIC ACID	56733
57801	DIAZINON	55299
69004	PYRETHRIN COILS	23477
56801	CARBARYL	18864
75202	SODIUM FLUORIDE	17686
72602	SILICA GEL	17212
63503	REFINED PETROLEUM HYDROCARBONS	13104
67501	PIPERONYL BUTOXIDE	3385

TABLE 3
ESTIMATES OF NATIONAL USAGE OF ACTIVE INGREDIENTS IN 1981, BY PRODUCT CLASS AND FORMULATION.

(RELATIVE STANDARD ERRORS ARE GIVEN IN APPENDIX F)

PRODUCT CLASS=INSECTICIDE FORMULATION=DUST

CHEMCODE	CHEMICAL	POUNDS
72605	SILICON DIOXIDE	2244
11102	BORAX	1448
0	ALL OTHERS	6715
FORM		216167

PRODUCT CLASS=INSECTICIDE FORMULATION=GRANULAR/PELLETED

CHEMCODE	CHEMICAL	POUNDS
57801	DIAZINON	198968
66501	ALUMINUM PHOSPHIDE	198021
57201	THIMET	68873
59101	CHLORPYRIFOS	57289
90601	FURADAN	35241
41101	MOCAP	26468
109401	ISOFENPHOS	26222
56801	CARBARYL	15249
53001	METALDEHYDE	14048
41701	DYFONATE	10674
0	ALL OTHERS	20934
FORM		671986

PRODUCT CLASS=INSECTICIDE FORMULATION=LIQUID CONCENTRATE

CHEMCODE	CHEMICAL	POUNDS
58201	CHLORDANE	3625437
6501	AROMATIC PETROLEUM DERIVATIVE SOLVENT	3277718
63503	REFINED PETROLEUM HYDROCARBONS	3134747
86802	DIMETHYLBENZENE	3125260
86803	XYLENE RANGE AROMATIC SOLVENT	1603882
59101	CHLORPYRIFOS	1541858
57801	DIAZINON	1379692
44801	HEPTACHLOR	1199557
34001	METHOXYCHLOR	730502
45101	ALDRIN	704274
0	ALL OTHERS	2294800
FORM		22617728

TABLE 3
ESTIMATES OF NATIONAL USAGE OF ACTIVE INGREDIENTS IN 1981, BY PRODUCT CLASS AND FORMULATION.
(RELATIVE STANDARD ERRORS ARE GIVEN IN APPENDIX F)

PRODUCT CLASS=INSECTICIDE FORMULATION=OTHER

CHEMCODE	CHEMICAL	POUNDS
63503	REFINED PETROLEUM HYDROCARBONS	1103850
57801	DIAZINON	9508
61501	PARADICHLOROBENZENE	4670
63502	MINERAL OIL, SEAL OR WHITE	378
81101	TRICHLOROBENZENE	322
31608	CASTOR OIL	82
40501	CITRUS OIL	81
9001	LINDANE	55
22001	ASPHALT	42
99401	GUM RESINS	29
0	ALL OTHERS	109
FORM		1119126

PRODUCT CLASS=INSECTICIDE FORMULATION=PRESSURIZED

CHEMCODE	CHEMICAL	POUNDS
78003	SULFURYL FLUORIDE	2688325
53201	METHYL BROMIDE	1599622
63503	REFINED PETROLEUM HYDROCARBONS	70065
81501	CHLOROPICRIN	30667
78501	TETRACHLOROETHYLENE	12759
84001	DDVP	12600
13	TRICHOLROFLUOROMETHANE	7974
14	DICHLORO DIFLUORO METHANE	7974
67501	PIPERONYL BUTOXIDE	6536
11001	BORIC ACID	6335
0	ALL OTHERS	26227
FORM		4469084

PRODUCT CLASS=INSECTICIDE FORMULATION=READY-TO-USE SOLUTION

CHEMCODE	CHEMICAL	POUNDS
42003	ETHYLENE DICHLORIDE	3172555
63503	REFINED PETROLEUM HYDROCARBONS	1771539
16501	CARBON TETRACHLORIDE	1348625
42002	ETHYLENE DIBROMIDE	251797
77601	SULFUR DIOXIDE	147312
6601	PETROLEUM DERIVED AROMATIC HYDROCARBONS	30957
57001	OCTYL BICYCLOHEPTENE DICARBOXIMIDE	29404
63502	MINERAL OIL, SEAL OR WHITE	25124
63506	MINERAL SPIRITS (ODORLESS)	23901
57701	MALATHION	19884
0	ALL OTHERS	114211
FORM		6935310

TABLE 3
ESTIMATES OF NATIONAL USAGE OF ACTIVE INGREDIENTS IN 1981, BY PRODUCT CLASS AND FORMULATION.

(RELATIVE STANDARD ERRORS ARE GIVEN IN APPENDIX F)

PRODUCT CLASS=INSECTICIDE FORMULATION=WETTABLE POWDER

CHEMCODE	CHEMICAL	POUNDS
56801	CARBARYL	482385
105201	BENDIOCARB	180587
103301	ORTHENE	77010
57701	MALATHION	63343
34001	METHOXYCHLOR	53507
57901	TRICHLORFON	42161
10501	DICOFOL	38759
59201	PHOSMET	13573
47802	BAYGON	6375
58001	GUTHION	4590
0	ALL OTHERS	10071
FORM		972362
CLASS		37001762

PRODUCT CLASS=MICROBICIDE FORMULATION=LIQUID CONCENTRATE

CHEMCODE	CHEMICAL	POUNDS
67002	PINE OIL	4422
79009	SOAP	847
22101	CRESYLIC ACID, COAL TAR ACIDS & PHENOLS	821
69129	HYAMINE 2389	757
47501	PROPANOL	737
69153	ALKYL* TRIMETHYL AMMONIUM BROMIDE *(95%	293
76406	TRISODIUM PHOSPHATE	63
69104	ALKYL* DIMETHYL BENZYL AMMONIUM CHLORIDE	46
69154	ALKYL* DIMETHYL ETHYLBENZYL AMMONIUM CHL	46
14701	CALCIUM HYPOCHLORITE	35
0	ALL OTHERS	30
FORM		8098

PRODUCT CLASS=MICROBICIDE FORMULATION=OTHER

CHEMCODE	CHEMICAL	POUNDS
46901	BUTOXY...ETHOXYETHANOL-IODINE COMPLEX	1587
46909	POLYETHOXY...ETHOXYETHANOL-IODINE COMPLE	47
FORM		1634

TABLE 3
ESTIMATES OF NATIONAL USAGE OF ACTIVE INGREDIENTS IN 1981,
BY PRODUCT CLASS AND FORMULATION.
(RELATIVE STANDARD ERRORS ARE GIVEN IN APPENDIX F)

PRODUCT CLASS=MICROBICIDE FORMULATION=PRESSURIZED

CHEMCODE	CHEMICAL	POUNDS
1501	ETHYL ALCOHOL	1610
83501	TRIETHYLENE GLYCOL	840
68604	DIPROPYLENE GLYCOL	201
40501	CITRUS OIL	50
68603	PROPYLENE GLYCOL	32
69140	ALKYL* DIMETHYL BENZYL AMMONIUM CHLORIDE	10
69104	ALKYL* DIMETHYL BENZYL AMMONIUM CHLORIDE	1
69154	ALKYL* DIMETHYL ETHYLBENZYL AMMONIUM CHL	1
FORM		2745

PRODUCT CLASS=MICROBICIDE FORMULATION=READY-TO-USE SOLUTION

CHEMCODE	CHEMICAL	POUNDS
69183	WSCP	44
CLASS		12520

PRODUCT CLASS=VERTEBRATE PESTICIDE FORMULATION=DUST

CHEMCODE	CHEMICAL	POUNDS
88601	ZINC PHOSPHIDE	6616
86002	WARFARIN	276
80501	TOXAPHENE	150
67707	CHLOROPHACINONE	139
69201	AMINOPYRIDINE	91
56704	TOBACCO DUST	50
611	DRIED BLOOD	11
55801	NAPHTHALENE	11
67701	DIPHACINONE	6
FORM		7350

PRODUCT CLASS=VERTEBRATE PESTICIDE FORMULATION=GRANULAR/PELLETED

CHEMCODE	CHEMICAL	POUNDS
88601	ZINC PHOSPHIDE	349
86001	FUMARIN	135
76901	STRYCHNINE	125
69201	AMINOPYRIDINE	95
86002	WARFARIN	65
67703	PIVAL	61
67701	DIPHACINONE	53
112701	BRODIFACOUM	38
70801	RED SQUILL	14

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TABLE 3
ESTIMATES OF NATIONAL USAGE OF ACTIVE INGREDIENTS IN 1981, BY PRODUCT CLASS AND FORMULATION.
(RELATIVE STANDARD ERRORS ARE GIVEN IN APPENDIX F)

PRODUCT CLASS=VERTEBRATE PESTICIDE FORMULATION=GRANULAR/PELLETED

CHEMCODE	CHEMICAL	POUNDS
67705	DIPHACINONE, SODIUM SALT OF	13
0	ALL OTHERS	11
FORM		959

PRODUCT CLASS=VERTEBRATE PESTICIDE FORMULATION=LIQUID CONCENTRATE

CHEMCODE	CHEMICAL	POUNDS
67704	PIVAL, SODIUM SALT OF	215
75003	SODIUM FLUOROACETATE	149
67707	CHLOROPHACINONE	69
67703	PIVAL	8
86004	FUMARIN, SODIUM SALT OF	8
FORM		449

PRODUCT CLASS=VERTEBRATE PESTICIDE FORMULATION=OTHER

CHEMCODE	CHEMICAL	POUNDS
86002	WARFARIN	2188
11402	POLYBUTENE	1325
76104	SODIUM NITRATE	13
31604	HYDROGENATED CASTOR OIL	12
16001	CARBON	5
63502	MINERAL OIL, SEAL OR WHITE	4
77501	SULFUR	3
66502	PHOSPHORUS	1
FORM		3552

PRODUCT CLASS=VERTEBRATE PESTICIDE FORMULATION=PRESSURIZED

CHEMCODE	CHEMICAL	POUNDS
63503	REFINED PETROLEUM HYDROCARBONS	5809
11402	POLYBUTENE	5535
FORM		11344

TABLE 3
ESTIMATES OF NATIONAL USAGE OF ACTIVE INGREDIENTS IN 1981, BY PRODUCT CLASS AND FORMULATION.
(RELATIVE STANDARD ERRORS ARE GIVEN IN APPENDIX F)

---------------------- PRODUCT CLASS=VERTEBRATE PESTICIDE FORMULATION=READY-TO-USE SOLUTION ----------------------------------

CHEMCODE	CHEMICAL	POUNDS
11402	POLYBUTENE	132325
11403	POLYISOBUTYLENE	8744
41601	ENDRIN	226
63502	MINERAL OIL, SEAL OR WHITE	201
6601	PETROLEUM DERIVED AROMATIC HYDROCARBONS	133
53301	BAYTEX	133
169111	DIALKYL* DIMETHYL AMMONIUM BENTONITE *(A	11
FORM		141773
CLASS		165427
		47134116

Table 3A. Estimates of National Usage of Pounds of Active Ingredients in 1981 in Vertebrate Pesticides
Table courtesy of Dr. William B. Jackson, Bowling Green State University

Chemical	Formulation Dust	Granular/ Pelleted	Liquid Concentrate	Other	Pressurized	Ready-to-Use Solution	Totals
Rodenticides							
Zinc phosphide	6616	349	-	-	-	-	6965
Phosphorus	-	-	-	1	-	-	1
Red Squill	-	14	-	-	-	-	14
1080	-	-	149	-	-	-	149
						sub-total	7129
Warfarin	276	65	-	2188	-	-	2529
Fumarin	-	135	8*	-	-	-	143
Pival	-	61	223*	-	-	-	284
Diphacinone	6	66*	-	-	-	-	72
Chlorophacinone	139	-	69	-	-	-	208
Brodifacoum	-	38	-	-	-	-	38
						sub-total	3274
Bird Management							
Baytex	-	-	-	-	-	133	133
Endrin**	-	-	-	-	-	226	226
Aminopyridine	91	95	-	-	-	-	186
Strychnine**	-	125	-	-	-	-	125
Polybutane, polyisobutane***	-	-	-	1325	5535	141,069	147,929
Hydrogenated caster oil***	-	-	-	12	-	-	12
Mineral oil***	-	-	-	4	-	201	205
Refined petroleum hydrocardons***	-	-	-	-	5809	-	5809
Petroleum derived aromatic hydrocarbons**	-	-	-	-	-	133	133
						sub-total	154,758
Other****							
Toxaphene	150	-	-	-	-	-	150
Tobacco dust	50	-	-	-	-	-	50
Dried blood	11	-	-	-	-	-	11
Naphthalene	11	-	-	-	-	-	11
Sodim Nitrate	-	-	-	13	-	-	13
Carbon	-	-	-	5	-	-	5
Sulfur	-	-	-	3	-	-	3
Bentonite	-	-	-	-	-	11	11
Other	-	11	-	-	-	-	11
						sub-total	265
						Grand Total	165,426

* includes sodium salt
** presumed to be for bird management use
*** non-toxic compounds
**** non-toxic or specific use not related to commensal rodents

Table 4. Gross Sales of Pest Control Firms in 1981, by EPA Region and Industry Sector

EPA Region	Industry Sector	Number of Reporting Aggregates with Gross Sales of						
		Unknown	<$25,000	$25,000-$99,999	$100,000-$499,999	$500,000-$999,999	$1,000,000-$5,000,000	>$5,000,000
					National Totals			
	Lawn	47	349	471	360	28	22	1
	Tree	66	497	417	379	60	65	6
	Tree and/or Lawn	450	801	823	769	112	66	13
	Structural	1,444	3,065	2,482	1,463	180	149	32
	Structural and Tree and/or Lawn	379	510	797	679	133	79	43
	Overall	2,386	5,223	4,989	3,651	511	380	96
					Regional Totals			
1	Lawn	0	34	52	15	0	0	1
	Tree	33	51	110	34	5	2	2
	Tree and/or Lawn	22	66	103	54	11	0	0
	Structural	38	165	74	57	4	5	0
	Structural and Tree and/or Lawn	18	13	64	17	4	0	1
	Overall	110	328	404	177	24	6	4
2	Lawn	0	40	122	80	2	1	1
	Tree	5	51	49	74	6	23	2
	Tree and/or Lawn	10	142	148	85	16	1	2
	Structural	92	490	261	86	22	9	11
	Structural and Tree and/or Lawn	0	10	53	51	0	0	1
	Overall	107	733	633	376	45	33	18
3	Lawn	13	34	45	39	1	4	1
	Tree	0	12	21	85	30	5	2
	Tree and/or Lawn	49	29	116	117	25	13	4
	Structural	186	395	254	121	17	5	5
	Structural and Tree and/or Lawn	14	11	17	16	4	7	1
	Overall	262	481	453	379	77	35	13

Table 4. Gross Sales of Pest Control Firms in 1981, by EPA Region and Industry Sector (continued)

EPA Region	Industry Sector	Number of Reporting Aggregates with Gross Sales of						
		Unknown	<$25,000	$25,000-$99,999	$100,000-$499,999	$500,000-$999,999	$1,000,000-$5,000,000	>$5,000,000
4	Lawn	10	46	42	19	5	0	1
	Tree	6	50	27	36	10	2	2
	Tree and/or Lawn	70	145	84	123	4	8	0
	Structural	281	734	699	478	58	50	6
	Structural and Tree and/or Lawn	135	92	137	269	34	9	6
	Overall	502	1,066	988	925	112	69	16
5	Lawn	8	120	143	186	17	13	1
	Tree	5	134	61	56	12	8	6
	Tree and/or Lawn	125	224	195	207	30	20	0
	Structural	231	389	343	152	26	20	1
	Structural and Tree and/or Lawn	26	51	41	63	43	7	38
	Overall	394	917	784	664	128	67	46
6	Lawn	0	7	0	0	0	0	1
	Tree	0	25	21	27	0	8	2
	Tree and/or Lawn	87	61	39	24	6	4	0
	Structural	272	420	328	204	24	10	5
	Structural and Tree and/or Lawn	150	171	244	124	22	43	0
	Overall	509	684	632	379	52	64	9
7	Lawn	0	46	48	5	4	0	1
	Tree	0	77	46	41	2	0	2
	Tree and/or Lawn	26	82	92	62	0	0	4
	Structural	134	344	195	84	30	13	11
	Structural and Tree and/or Lawn	4	79	63	15	2	0	0
	Overall	165	628	444	207	37	14	19

Table 4. Gross Sales of Pest Control Firms in 1981, by EPA Region and Industry Sector (continued)

EPA Region	Industry Sector	Number of Reporting Aggregates with Gross Sales of						
		Unknown	<$25,000	$25,000-$99,999	$100,000-$499,999	$500,000-$999,999	$1,000,000-$5,000,000	>$5,000,000
8	Lawn	16	7	21	5	0	5	1
	Tree	16	43	21	5	0	0	1
	Tree and/or Lawn	21	10	3	14	5	10	3
	Structural	16	11	57	30	9	3	1
	Structural and Tree and/or Lawn	10	27	29	21	5	0	0
	Overall	78	97	132	75	19	18	6
9	Lawn	0	20	0	15	0	0	1
	Tree	0	35	45	18	0	17	0
	Tree and/or Lawn	31	40	39	90	10	11	0
	Structural	227	159	355	348	48	34	1
	Structural and Tree and/or Lawn	16	31	116	68	12	16	0
	Overall	274	285	555	539	70	78	2
10	Lawn	0	0	0	0	0	0	1
	Tree	0	25	29	15	0	0	0
	Tree and/or Lawn	9	11	49	6	6	0	0
	Structural	39	41	31	10	1	5	1
	Structural and Tree and/or Lawn	6	28	44	44	9	0	0
	Overall	54	104	154	75	15	5	2

Table 5. Sales of Pest Control Services in 1981, By EPA Region and Industry Sector

EPA Region	Industry Sector	Number of Reporting Aggregates with Sales for Pest Control Service of						
		Unknown	<$25,000	$25,000-$99,999	$100,000-$499,999	$500,000-$999,999	$1,000,000-$5,000,000	>$5,000,000
				National Totals				
	Lawn	96	824	231	106	12	8	1
	Tree	69	998	310	97	2	8	6
	Tree and/or Lawn	348	2,206	376	84	9	10	0
	Structural	1,179	3,529	2,609	1,235	160	97	6
	Structural and Tree and/or Lawn	292	1,026	723	532	34	9	4
	Overall	1,984	8,582	4,248	2,054	217	133	17
				Regional Totals				
1	Lawn	0	56	33	12	0	0	1
	Tree	33	85	92	24	2	0	2
	Tree and/or Lawn	22	195	39	0	0	0	0
	Structural	41	169	71	53	4	5	0
	Structural and Tree and/or Lawn	18	55	42	0	0	1	0
	Overall	114	559	277	89	5	5	3
2	Lawn	26	160	51	7	0	0	1
	Tree	5	122	65	14	0	0	2
	Tree and/or Lawn	15	345	15	21	5	2	0
	Structural	81	539	244	83	16	3	6
	Structural and Tree and/or Lawn	0	59	28	27	0	1	0
	Overall	127	1,226	403	152	22	6	9
3	Lawn	21	94	12	10	0	0	1
	Tree	1	99	30	23	0	0	2
	Tree and/or Lawn	30	275	38	6	0	4	0
	Structural	230	443	228	59	13	5	4
	Structural and Tree and/or Lawn	14	25	24	6	0	1	0
	Overall	296	935	333	105	13	9	7

Table 5. Sales of Pest Control Services in 1981, By EPA Region and Industry Sector (continued)

EPA Region	Industry Sector	Number of Reporting Aggregates with Sales for Pest Control Service of						
		Unknown	<$25,000	$25,000-$99,999	$100,000-$499,999	$500,000-$999,999	$1,000,000-$5,000,000	>$5,000,000
4	Lawn	5	67	35	10	4	0	1
	Tree	6	99	23	4	0	0	2
	Tree and/or Lawn	60	301	48	17	4	4	0
	Structural	244	885	707	401	44	24	1
	Structural and Tree and/or Lawn	81	133	204	225	27	7	4
	Overall	397	1,486	1,017	656	79	35	9
5	Lawn	16	305	92	56	8	8	1
	Tree	0	230	31	16	0	0	6
	Tree and/or Lawn	83	590	112	14	0	0	0
	Structural	142	427	437	134	9	14	1
	Structural and Tree and/or Lawn	60	118	24	59	5	3	0
	Overall	301	1,670	696	279	22	25	8
6	Lawn	0	7	0	0	0	0	1
	Tree	0	73	0	0	0	8	2
	Tree and/or Lawn	42	157	14	8	0	0	0
	Structural	144	501	409	174	23	10	1
	Structural and Tree and/or Lawn	53	342	225	134	2	0	0
	Overall	240	1,080	648	316	25	18	4
7	Lawn	8	87	5	4	0	0	1
	Tree	8	121	33	4	0	0	2
	Tree and/or Lawn	33	168	57	8	0	0	0
	Structural	135	386	195	77	15	3	1
	Structural and Tree and/or Lawn	9	120	32	2	0	0	0
	Overall	192	882	322	94	15	3	4

Table 5. Sales of Pest Control Services in 1981, By EPA Region and Industry Sector
(continued)

EPA Region	Industry Sector	Number of Reporting Aggregates with Sales for Pest Control Service of						
		Unknown	<$25,000	$25,000-$99,999	$100,000-$499,999	$500,000-$999,999	$1,000,000-$5,000,000	>$5,000,000
8	Lawn	16	32	5	0	0	0	1
	Tree	16	59	10	0	0	0	1
	Tree and/or Lawn	21	26	14	5	0	0	0
	Structural	9	37	48	26	6	1	1
	Structural and Tree and/or Lawn	3	48	22	18	0	0	0
	Overall	65	203	98	49	6	1	3
9	Lawn	5	20	0	10	0	0	1
	Tree	0	84	21	10	0	0	0
	Tree and/or Lawn	41	125	50	5	0	0	0
	Structural	155	204	381	349	48	34	1
	Structural and Tree and/or Lawn	40	75	94	50	0	0	0
	Overall	241	507	546	425	48	34	2
10	Lawn	0	0	0	0	0	0	1
	Tree	0	43	16	10	0	0	0
	Tree and/or Lawn	9	38	33	0	0	0	0
	Structural	39	46	31	6	0	5	1
	Structural and Tree and/or Lawn	15	54	40	22	0	0	0
	Overall	63	181	120	38	0	5	2

Table 6. Number of Employees of Pest Control Firms, in 1981, By EPA Region and Industry Sector

EPA Region	Industry Sector	Number of Service Technicians and Technical Managers	Number of Clerical, Sales and Other Employees	Weighted Number of Reporting Aggregates that Provided Data	Weighted Number of Reporting Aggregates That Did Not Provide Data
				National Totals	
	Lawn	6,606	2,251	1,210	68
	Tree	8,324	4,265	1,395	95
	Tree and/or Lawn	14,594	4,848	2,661	372
	Structural	40,345	18,945	7,862	953
	Structural and Tree and/or Lawn	14,791	6,115	2,212	408
	Overall	84,659	36,424	15,339	1,897
				Regional Totals	
1	Lawn	401	119	101	0
	Tree	1,436	328	213	19
	Tree and/or Lawn	973	384	237	18
	Structural	1,242	317	323	8
	Structural and Tree and/or Lawn	377	181	102	14
	Overall	4,429	1,329	975	59
2	Lawn	1,086	352	239	5
	Tree	2,071	405	195	2
	Tree and/or Lawn	2,090	444	387	15
	Structural	2,607	1,261	835	59
	Structural and Tree and/or Lawn	604	168	104	5
	Overall	8,457	2,631	1,760	86

Table 6. Number of Employees of Pest Control Firms, in 1981, By EPA Region and Industry Sector (continued)

		Number of			
EPA Region	Industry Sector	Service Technicians and Technical Managers	Clerical, Sales and Other Employees	Weighted Number of Reporting Aggregates that Provided Data	Weighted Number of Reporting Aggregates That Did Not Provide Data
3	Lawn	688	195	129	6
	Tree	1,537	361	140	10
	Tree and/or Lawn	1,633	534	291	60
	Structural	4,602	2,542	886	44
	Structural and Tree and/or Lawn	256	132	66	0
	Overall	8,714	3,764	1,513	119
4	Lawn	427	160	96	24
	Tree	443	403	112	15
	Tree and/or Lawn	1,963	462	363	69
	Structural	11,873	5,429	2,022	203
	Structural and Tree and/or Lawn	3,520	2,392	547	134
	Overall	18,224	8,846	3,141	445
5	Lawn	3,215	1,172	470	8
	Tree	1,513	1,530	261	13
	Tree and/or Lawn	2,885	1,569	705	78
	Structural	5,473	2,557	931	125
	Structural and Tree and/or Lawn	4,752	1,525	196	64
	Overall	17,837	8,352	2,564	288

Table 6. Number of Employees of Pest Control Firms, in 1981, By EPA Region and Industry Sector (continued)

EPA Region	Industry Sector	Number of: Service Technicians and Technical Managers	Number of: Clerical, Sales and Other Employees	Weighted Number of Reporting Aggregates that Provided Data	Weighted Number of Reporting Aggregates That Did Not Provide Data
6	Lawn	142	23	4	4
	Tree	234	90	73	6
	Tree and/or Lawn	502	220	140	80
	Structural	4,252	1,952	1,021	223
	Structural and Tree and/or Lawn	2,946	1,010	614	138
	Overall	8,075	3,295	1,853	451
7	Lawn	427	84	99	5
	Tree	492	136	162	0
	Tree and/or Lawn	1,422	255	217	11
	Structural	2,650	984	669	78
	Structural and Tree and/or Lawn	415	126	152	10
	Overall	5,407	1,584	1,298	103
8	Lawn	105	115	37	16
	Tree	114	10	54	31
	Tree and/or Lawn	358	330	38	22
	Structural	414	144	89	14
	Structural and Tree and/or Lawn	269	43	76	10
	Overall	1,260	642	294	92

Table 6. Number of Employees of Pest Control Firms, in 1981, By EPA Region and Industry Sector
(continued)

EPA Region	Industry Sector	Number of Service Technicians and Technical Managers	Number of Clerical, Sales and Other Employees	Weighted Number of Reporting Aggregates that Provided Data	Weighted Number of Reporting Aggregates That Did Not Provide Data
9	Lawn	110	31	35	0
	Tree	292	942	115	0
	Tree and/or Lawn	2,539	606	210	10
	Structural	6,545	3,435	978	185
	Structural and Tree and/or Lawn	1,100	291	229	28
	Overall	10,585	5,305	1,568	223
10	Lawn	6	1	0	0
	Tree	192	60	69	0
	Tree and/or Lawn	231	45	71	9
	Structural	688	324	108	15
	Structural and Tree and/or Lawn	553	247	125	6
	Overall	1,670	677	373	30

Table 7. Number of Certified or Licensed Employees of Pest Control Firms in 1981, By EPA Region and Industry Sector

EPA Region	Industry Sector	Number of Certified or Licensed Employees	Weighted Number of Reporting Aggregates That Provided Data	Weighted Number of Reporting Aggregates That Did Not Provide Data
			National Totals	
	Lawn	2,536	1,201	77
	Tree	2,097	1,375	115
	Tree and/or Lawn	4,336	2,713	320
	Structural	16,048	7,398	1,417
	Structural and Tree and/or Lawn	5,115	2,232	389
	Overall	30,133	14,919	2,317
			Regional Totals	
1	Lawn	162	85	16
	Tree	526	188	43
	Tree and/or Lawn	375	236	20
	Structural	896	272	59
	Structural and Tree and/or Lawn	177	107	9
	Overall	2,136	887	147
2	Lawn	353	239	5
	Tree	290	197	0
	Tree and/or Lawn	521	392	10
	Structural	1,238	797	97
	Structural and Tree and/or Lawn	258	109	0
	Overall	2,661	1,735	112
3	Lawn	228	133	3
	Tree	232	149	0
	Tree and/or Lawn	447	339	13
	Structural	1,241	775	155
	Structural and Tree and/or Lawn	125	67	0
	Overall	2,274	1,462	170
4	Lawn	173	102	18
	Tree	131	120	7
	Tree and/or Lawn	923	380	53
	Structural	3,707	2,000	226
	Structural and Tree and/or Lawn	1,278	556	125
	Overall	6,211	3,158	428

Table 7. Number of Certified or Licensed Employees of Pest Control Firms in 1981, By EPA Region and Industry Sector (continued)

EPA Region	Industry Sector	Number of Certified or Licensed Employees	Weighted Number of Reporting Aggregates That Provided Data	Weighted Number of Reporting Aggregates That Did Not Provide Data
5	Lawn	1,307	469	8
	Tree	421	261	14
	Tree and/or Lawn	1,053	682	101
	Structural	1,903	920	136
	Structural and Tree and/or Lawn	884	244	16
	Overall	5,569	2,576	276
6	Lawn	4	7	0
	Tree	127	79	0
	Tree and/or Lawn	189	141	79
	Structural	2,018	959	285
	Structural and Tree and/or Lawn	1,233	630	122
	Overall	3,571	1,817	486
7	Lawn	217	98	6
	Tree	121	152	9
	Tree and/or Lawn	260	222	7
	Structural	951	644	103
	Structural and Tree and/or Lawn	209	128	34
	Overall	1,758	1,243	158
8	Lawn	37	37	16
	Tree	44	54	31
	Tree and/or Lawn	60	39	21
	Structural	206	75	28
	Structural and Tree and/or Lawn	155	76	10
	Overall	502	282	105
9	Lawn	55	30	5
	Tree	95	105	10
	Tree and/or Lawn	352	212	8
	Structural	3,606	877	285
	Structural and Tree and/or Lawn	404	212	45
	Overall	4,513	1,437	353

Table 7. Number of Certified or Licensed Employees of Pest Control Firms in 1981, By EPA Region and Industry Sector (continued)

EPA Region	Industry Sector	Number of Certified or Licensed Employees	Weighted Number of Reporting Aggregates That Provided Data	Weighted Number of Reporting Aggregates That Did Not Provide Data
10	Lawn	0	0	0
	Tree	109	69	0
	Tree and/or Lawn	156	71	9
	Structural	283	78	45
	Structural and Tree and/or Lawn	391	103	28
	Overall	939	322	81

Table 8. Multiple State Certification or Licensing in 1981, By Industry Sector

Are Any Employees Certified or Licensed in Multiple States?		Estimated Number of Reporting Aggregates Industry Sector					
		Lawn	Tree	Tree and/or Lawn	Structural	Structural and Tree and/or Lawn	Overall
Yes		122	159	206	1,442	256	2,185
Method:	Formal Examination	66	99	105	968	145	1,382
	Reciprocity	46	32	56	285	70	490
	Examination and Reciprocity	5	19	26	85	27	161
	Other or Unknown	0	0	0	6	0	6
	No Response	5	9	18	98	15	146
No		1,011	1,134	2,441	5,724	1,844	12,155
Don't Know		69	64	86	329	110	659
No Response		75	133	300	1,319	410	2,237

Table 9. Number of Business Locations Associated With Reporting Aggregates in 1981, By Industry Sector

Industry Sector	Number of States Served	Number of Business Locations in Reporting Aggregate					
		1	2	3-5	6-10	11-20	>20
Lawn	1	1,161	29	12	4	0	0
	2-3	68	0	1	0	0	0
	4-10	0	0	0	0	0	0
	11-50	1	0	1	0	1	0
		1,230	29	14	4	1	0
Tree	1	1,395	17	4	0	0	0
	2-3	56	8	5	0	0	0
	4-10	0	1	0	0	0	0
	11-50	1	0	0	0	0	1
		1,452	26	9	0	0	1
Tree and/or Lawn	1	2,797	48	14	0	0	0
	2-3	156	9	0	0	0	0
	4-10	8	1	0	0	0	0
	11-50	0	0	0	0	0	0
		2,961	58	14	0	0	0
Structural	1	7,521	335	63	31	7	0
	2-3	763	36	13	2	0	0
	4-10	25	10	0	2	0	4
	11-50	1	1	0	0	0	0
		8,310	382	76	35	7	4
Structural and Tree and/or Lawn	1	2,383	78	21	6	2	0
	2-3	110	12	0	0	0	0
	4-10	4	3	2	0	0	0
	11-50	0	0	0	0	0	1
		2,497	93	23	6	2	1
Overall	1	15,258	507	114	41	9	0
	2-3	1,154	66	19	2	0	0
	4-10	36	15	2	2	0	4
	11-50	3	1	0	0	1	2
		16,451	589	135	45	10	6

Table 10A

Percent of Gross Sales from Pest Control Services at Residential Single Family Structures in 1981, By Industry Sector and Reporting Aggregate Gross Sales
Entries in the table represent the estimated number of reporting aggregates in each category.

	Percent of Sales Associated with Site						Data Missing
	0	1-25	26-50	51-75	76-99	100	
Industry Sector							
Lawn	281	47	58	32	499	352	9
Tree	348	87	53	94	503	401	4
Tree and/or Lawn	985	302	209	249	673	561	54
Structural	2,066	976	1,194	1,177	2,693	656	53
Structural and Tree and/or Lawn	703	236	469	456	613	133	32
Reporting Aggregate Gross Sales							
<$25,000	936	435	627	578	1,624	967	56
$25,000-$99,999	781	518	568	622	1,774	707	20
$100,000-$499,999	505	410	537	559	1,310	296	33
$500,000-$999,999	125	42	44	137	149	13	0
$1,000,000-$5,000,000	104	115	47	21	52	40	0
>$5,000,000	32	14	39	5	5	0	0
Data Missing	1,898	114	120	86	67	59	42
Overall	4,382	1,648	1,983	2,008	4,982	2,081	151

Table 10B

Percent of Gross Sales from Pest Control Services at Residential Multiple Family Structures in 1981, By Industry Sector and Reporting Aggregate Gross Sales

Entries in the table represent the estimated number of reporting aggregates in each category.

	Percent of Sales Associated with Site						Data Missing
	0	1-25	26-50	51-75	76-99	100	
Industry Sector							
Lawn	808	382	18	0	21	4	44
Tree	997	391	4	0	14	23	61
Tree and/or Lawn	2,117	563	100	78	24	26	126
Structural	4,196	3,724	496	101	56	23	219
Structural and Tree and/or Lawn	1,108	1,239	138	23	26	17	69
Reporting Aggregate Gross Sales							
<$25,000	3,021	1,624	308	31	29	21	189
$25,000-$99,999	2,384	2,060	221	52	70	4	200
$100,000-$499,999	1,341	1,982	103	81	42	33	71
$500,000-$999,999	197	264	17	20	0	14	0
$1,000,000-$5,000,000	148	193	12	10	0	5	13
>$5,000,000	77	19	0	0	0	0	0
Data Missing	2,059	158	95	10	0	18	46
Overall	9,226	6,299	756	202	141	94	518

Table 10C

Percent of Gross Sales from Pest Control Services at Institutional Structures in 1981, By Industry Sector and Reporting Aggregate Gross Sales

Entries in the table represent the estimated number of reporting aggregates in each category.

	Percent of Sales Associated with Site						Data Missing
	0	1-25	26-50	51-75	76-99	100	
Industry Sector							
Lawn	1,047	160	5	10	0	0	56
Tree	1,156	250	13	14	4	0	53
Tree and/or Lawn	2,599	253	21	6	10	4	140
Structural	5,855	2,522	120	6	18	0	294
Structural and Tree and/or Lawn	1,710	799	37	0	0	0	75
Reporting Aggregate Gross Sales							
<$25,000	3,950	930	96	20	21	4	203
$25,000-$99,999	3,381	1,331	54	6	0	0	216
$100,000-$499,999	2,248	1,242	40	4	4	0	112
$500,000-$999,999	320	186	4	0	0	0	1
$1,000,000-$5,000,000	191	174	0	0	1	0	15
>$5,000,000	78	12	0	0	6	0	0
Data Missing	2,198	109	2	6	0	0	71
Overall	12,366	3,984	196	36	32	4	618

Table 10D

Percent of Gross Sales from Pest Control Services at Commercial Food Processing Areas in 1981, By Industry Sector and Reporting Aggregate Gross Sales

Entries in the table represent the estimated number of reporting aggregates in each category.

	Percent of Sales Associated with Site						Data Missing
	0	1-25	26-50	51-75	76-99	100	
Industry Sector							
Lawn	1,129	73	24	0	0	0	52
Tree	1,296	121	8	0	0	0	64
Tree and/or Lawn	2,679	168	14	15	4	0	152
Structural	4,289	3,337	637	236	75	49	192
Structural and Tree and/or Lawn	1,418	1,024	58	15	0	0	106
Reporting Aggregate Gross Sales							
<$25,000	3,304	1,348	199	117	53	14	188
$25,000-$99,999	2,854	1,635	217	30	15	0	240
$100,000-$499,999	1,981	1,264	197	115	7	0	87
$500,000-$999,999	304	184	18	4	0	0	1
$1,000,000-$5,000,000	189	144	29	1	4	0	13
>$5,000,000	68	11	12	0	0	4	0
Data Missing	2,112	138	69	0	0	31	36
Overall	10,812	4,723	741	267	79	49	565

Table 10E

Percent of Gross Sales from Pest Control Services at Industrial/Business Structures in 1981, By Industry Sector and Reporting Aggregate Gross Sales Entries in the table represent the estimated number of reporting aggregates in each category.

	Percent of Sales Associated with Site						Data Missing
	0	1-25	26-50	51-75	76-99	100	
Industry Sector							
Lawn	720	443	27	8	15	24	39
Tree	894	408	65	11	11	37	64
Tree and/or Lawn	1,657	790	260	104	71	52	98
Structural	4,714	3,436	337	29	25	25	249
Structural and Tree and/or Lawn	1,167	1,172	105	45	22	36	75
Reporting Aggregate Gross Sales							
<$25,000	3,259	1,496	173	35	17	42	201
$25,000-$99,999	2,261	2,098	220	58	76	57	221
$100,000-$499,999	1,280	2,006	194	45	35	60	29
$500,000-$999,999	165	298	33	3	5	5	1
$1,000,000-$5,000,000	119	155	63	20	11	1	10
>$5,000,000	27	24	41	0	0	4	0
Data Missing	2,040	174	70	36	0	4	63
Overall	9,153	6,250	794	196	144	173	526

Table 10F

Percent of Gross Sales from Pest Control Services For Right of Ways in 1981, By Industry Sector and Reporting Aggregate Gross Sales

Entries in the table represent the estimated number of reporting aggregates in each category.

	Percent of Sales Associated with Site						Data Missing
	0	1-25	26-50	51-75	76-99	100	
Industry Sector							
Lawn	1,089	114	0	0	0	4	70
Tree	1,332	51	2	5	12	19	68
Tree and/or Lawn	2,707	100	15	44	7	13	147
Structural	8,344	112	9	1	11	8	329
Structural and Tree and/or Lawn	2,229	188	52	9	5	0	137
Reporting Aggregate Gross Sales							
<$25,000	4,822	91	10	5	13	29	253
$25,000-$99,999	4,440	198	16	37	7	8	283
$100,000-$499,999	3,330	175	3	13	5	4	120
$500,000-$999,999	459	31	4	2	5	0	10
$1,000,000-$5,000,000	290	26	42	0	1	4	17
>$5,000,000	85	5	0	2	4	0	0
Data Missing	2,276	38	4	0	0	0	68
Overall	15,701	565	79	60	35	45	751

Table 10G

Percent of Gross Sales from Pest Control Services for Commercial Agriculture in 1981, By Industry Sector and Reporting Aggregate Gross Sales

Entries in the table represent the estimated number of reporting aggregates in each category.

	Percent of Sales Associated with Site						Data Missing
	0	1-25	26-50	51-75	76-99	100	
Industry Sector							
Lawn	1,201	2	4	0	0	9	61
Tree	1,376	46	0	0	0	0	68
Tree and/or Lawn	2,768	83	6	4	13	9	150
Structural	8,291	139	16	9	36	5	319
Structural and Tree and/or Lawn	2,208	210	18	5	45	5	129
Reporting Aggregate Gross Sales							
<$25,000	4,830	93	10	0	27	20	243
$25,000-$99,999	4,553	129	10	14	10	4	269
$100,000-$499,999	3,315	174	14	0	25	0	123
$500,000-$999,999	444	43	10	0	5	0	10
$1,000,000-$5,000,000	347	6	0	0	13	0	14
>$5,000,000	80	1	0	0	14	0	0
Data Missing	2,275	34	0	5	0	4	68
Overall	15,844	480	44	19	93	28	728

Table 11A

Number of Accounts for Single Family Structures in 1981, By Industry Sector and Reporting Aggregate Size

	Number of Accounts	Number of Responding Aggregates	Number of Nonresponding Aggregates
Industry Sector			
Lawn	1,363,882	770	507
Tree	312,096	856	634
Tree and/or Lawn	264,953	1,409	1,624
Structural	2,112,303	3,812	5,003
Structural and Tree and/or Lawn	778,276	1,357	1,264
Report Aggregate Gross Sales			
<$25,000	273,196	2,780	2,443
$25,000-$99,999	922,080	2,836	2,154
$100,000-$499,999	1,412,346	1,940	1,710
$500,000-$999,999	383,839	255	256
$1,000,000-$5,000,000	561,201	167	213
>$5,000,000	1,243,388	22	74
Data Missing	35,359	204	2,182
Overall	4,831,509	8,204	9,032

Table 11B

Number of Accounts for Multiple Family Structures in 1981, By Industry Sector and Reporting Aggregate Size

	Number of Accounts	Number of Responding Aggregates	Number of Nonresponding Aggregates
Industry Sector			
Lawn	17,611	377	900
Tree	6,207	403	1,087
Tree and/or Lawn	8,382	712	2,321
Structural	196,144	2,825	5,989
Structural and Tree and/or Lawn	41,137	1,120	1,500
Report Aggregate Gross Sales			
<$25,000	15,754	1,572	3,651
$25,000-$99,999	47,086	1,848	3,142
$100,000-$499,999	81,408	1,490	2,161
$500,000-$999,999	36,776	226	285
$1,000,000-$5,000,000	19,133	150	230
>$5,000,000	65,602	16	80
Data Missing	3,721	135	2,251
Overall	269,481	5,438	11,798

Table 11C

Number of Accounts for Institutional Structures in 1981, By Industry Sector and Reporting Aggregate Size

	Number of Accounts	Number of Responding Aggregates	Number of Nonresponding Aggregates
Industry Sector			
Lawn	1,851	226	1,051
Tree	2,715	323	1,167
Tree and/or Lawn	1,421	431	2,602
Structural	65,010	2,147	6,668
Structural and Tree and/or Lawn	11,244	906	1,715
Report Aggregate Gross Sales			
<$25,000	3,222	1,115	4,108
$25,000-$99,999	16,789	1,403	3,587
$100,000-$499,999	23,692	1,115	2,536
$500,000-$999,999	8,922	153	358
$1,000,000-$5,000,000	8,589	134	246
>$5,000,000	20,459	10	86
Data Missing	568	103	2,283
Overall	82,241	4,032	13,204

Table 11D

Number of Accounts for Commercial Food Processing Areas in 1981, By Industry Sector and Reporting Aggregate Size

	Number of Accounts	Number of Responding Aggregates	Number of Nonresponding Aggregates
Industry Sector			
Lawn	2,430	214	1,064
Tree	1,312	227	1,262
Tree and/or Lawn	1,531	422	2,611
Structural	225,993	2,841	5,974
Structural and Tree and/or Lawn	31,936	959	1,662
Report Aggregate Gross Sales			
<$25,000	15,654	1,431	3,792
$25,000-$99,999	24,916	1,628	3,362
$100,000-$499,999	93,764	1,160	2,491
$500,000-$999,999	23,750	152	359
$1,000,000-$5,000,000	35,752	132	248
>$5,000,000	68,126	12	84
Data Missing	1,241	149	2,237
Overall	263,202	4,663	12,573

Table 11E

Number of Accounts for Industrial/Business Structures in 1981, By Industry Sector and Reporting Aggregate Size

	Number of Accounts	Number of Responding Aggregates	Number of Nonresponding Aggregates
Industry Sector			
Lawn	11,613	418	860
Tree	5,595	455	1,034
Tree and/or Lawn	19,586	946	2,087
Structural	172,557	2,695	6,119
Structural and Tree and/or Lawn	38,112	1,112	1,509
Report Aggregate Gross Sales			
<$25,000	11,496	1,574	3,649
$25,000-$99,999	36,041	1,946	3,044
$100,000-$499,999	90,070	1,559	2,091
$500,000-$999,999	25,804	214	297
$1,000,000-$5,000,000	38,627	159	221
>$5,000,000	41,705	18	78
Data Missing	3,719	155	2,231
Overall	247,463	5,626	11,610

Table 11F

Number of Accounts for Right of Ways in 1981, By Industry Sector and Reporting Aggregate Size

	Number of Accounts	Number of Responding Aggregates	Number of Nonresponding Aggregates
Industry Sector			
Lawn	108	187	1,091
Tree	453	223	1,267
Tree and/or Lawn	1,068	412	2,621
Structural	924	1,125	7,690
Structural and Tree and/or Lawn	30,096	601	2,020
Report Aggregate Gross Sales			
<$25,000	703	787	4,436
$25,000-$99,999	916	959	4,031
$100,000-$499,999	1,190	542	3,109
$500,000-$999,999	413	93	418
$1,000,000-$5,000,000	29,373	85	295
>$5,000,000	54	11	85
Data Missing	0	71	2,315
Overall	32,649	2,547	14,683

Table 11G

Number of Accounts for Commerical Agriculture in 1981, By Industry Sector and Reporting Aggregate Size

	Number of Accounts	Number of Responding Aggregates	Number of Nonresponding Aggregates
Industry Sector			
Lawn	774	184	1,093
Tree	34	199	1,291
Tree and/or Lawn	1,079	377	2,656
Structural	4,408	1,148	7,667
Structural and Tree and/or Lawn	34,817	640	1,981
Report Aggregate Gross Sales			
<$25,000	2,741	803	4,420
$25,000-$99,999	2,727	916	4,073
$100,000-$499,999	32,922	594	3,057
$500,000-$999,999	1,143	101	411
$1,000,000-$5,000,000	1,061	54	326
>$5,000,000	519	5	91
Data Missing	0	76	2,310
Overall	41,112	2,548	14,688

TABLE 12A
PERCENT OF GROSS SALES FROM LAWN AND TURF IN 1981, BY REPCRTING AGGREGATE SIZE.

ENTRIES IN THE TABLE REPRESENT THE ESTIMATED NUMBER OF REPORTING AGGREGATES IN EACH CATEGORY.

	PERCENT OF GROSS SALES CATEGORIES						
	0	1-25	26-50	51-75	76-99	100	DATA MISSING
REPORTING AGGREGATE GROSS SALES							
<$25,000	3573	548	230	141	259	290	182
$25,000-$99,999	2906	812	368	167	258	392	86
$100,000-$499,999	1723	866	253	259	296	208	44
$500,000-$999,999	220	165	53	41	12	20	0
$1,000,000-$5,000,000	188	71	38	50	6	21	5
>$5,000,000	66	24	5	0	0	1	0
DATA MISSING	2021	231	42	27	25	33	7

TABLE 12B

PERCENT OF GROSS SALES FROM TREE,SHRUB, AND ORNAMENTAL IN 1981, BY REPORTING AGGREGATE SIZE.
ENTRIES IN THE TABLE REPRESENT THE ESTIMATED NUMBER OF REPORTING AGGREGATES IN EACH CATEGORY.

	PERCENT OF GROSS SALES CATEGORIES						
	0	1-25	26-50	51-75	76-99	100	DATA MISSING
REPORTING AGGREGATE GROSS SALES							
<$25,000	3319	604	305	146	224	481	144
$25,000-$99,999	2928	859	315	244	233	355	54
$100,000-$499,999	1764	845	359	158	244	252	29
$500,000-$999,999	229	79	76	53	30	43	0
$1,000,000-$5,000,000	172	77	68	12	13	37	0
>$5,000,000	33	21	36	2	1	2	0
DATA MISSING	1983	141	68	77	48	66	3

TABLE 12C
PERCENT OF GROSS SALES FROM TERMITES AND OTHER WOOD DESTROYERS IN 1981, BY REPORTING AGGREGATE SIZE.

ENTRIES IN THE TABLE REPRESENT THE ESTIMATED NUMBER OF REPORTING AGGREGATES IN EACH CATEGORY.

	PERCENT OF GROSS SALES CATEGORIES						
	0	1-25	26-50	51-75	76-99	100	DATA MISSING
REPORTING AGGREGATE GROSS SALES							
<$25,000	2948	934	478	331	203	139	190
$25,000-$99,999	2519	1078	654	173	296	137	132
$100,000-$499,999	1797	711	539	324	72	125	83
$500,000-$999,999	278	142	45	22	9	5	11
$1,000,000-$5,000,000	218	94	24	20	17	0	5
>$5,000,000	77	9	6	0	0	0	4
DATA MISSING	1720	228	270	20	19	94	35

TABLE 12D
PERCENT OF GROSS SALES FROM COMMODITY FUMIGATIONS IN 1981, BY REPORTING AGGREGATE SIZE.

ENTRIES IN THE TABLE REPRESENT THE ESTIMATED NUMBER OF REPORTING AGGREGATES IN EACH CATEGORY.

	PERCENT OF GROSS SALES CATEGORIES						
	0	1-25	26-50	51-75	76-99	100	DATA MISSING
REPORTING AGGREGATE GROSS SALES							
<$25,000	4902	35	13	0	0	14	259
$25,000-$99,999	4701	111	3	0	15	0	158
$100,000-$499,999	3225	301	18	3	6	7	93
$500,000-$999,999	465	25	6	0	0	4	11
$1,000,000-$5,000,000	332	43	0	0	0	0	5
>$5,000,000	78	14	0	0	0	0	4
DATA MISSING	2315	7	0	15	0	5	43

TABLE 12E
PERCENT OF GROSS SALES FROM GERNERAL PEST CONTROL IN 1981, BY REPORTING AGGREGATE SIZE.

ENTRIES IN THE TABLE REFRESENT THE ESTIMATED NUMBER OF
REPORTING AGGREGATES IN EACH CATEGORY.

	PERCENT OF GROSS SALES CATEGORIES						
	0	1-25	26-50	51-75	76-99	100	DATA MISSING
REPORTING AGGREGATE GROSS SALES							
<$25,000	1811	532	486	518	685	1036	156
$25,000-$99,999	1756	827	427	820	740	306	114
$100,000-$499,999	1497	478	567	553	392	88	76
$500,000-$999,999	182	89	105	46	68	10	11
$1,000,000-$5,000,000	134	75	55	26	46	39	5
>$5,000,000	25	20	33	13	0	0	4
DATA MISSING	1600	76	153	236	147	139	35

Table 13. National Trade Association Membership in 1981, By Size of Reporting Aggregate

Reporting Aggregate Size (Gross Sales, in Dollars)	Estimated Number of Reporting Aggregates with Membership in National Associations					
	NPCA	NAA	PLCA	Other	None	No Response
<$25,000	211	20	11	16	703	1,445
$25,000-$99,999	383	38	50	168	4,377	226
$100,000-$499,999	949	140	124	218	3,445	165
$500,000-$999,999	1,071	175	151	338	1,815	142
$1,000,000-$5,000,000	162	53	72	62	115	58
>$5,000,000	157	27	62	31	143	4
Data Missing	25	40	39	10	13	5
	2,958	494	508	844	10,612	2,045

Table 14. Membership in State or Regional Trade Associations in 1981, By Industry Sector and Size of Reporting Aggregate

Industry Sector	Reporting Aggregate Size (Gross Sales, in Dollars)	Estimated Number of Reporting Aggregates with Membership in State or Regional Trade Associations			
		Yes	No	Don't Know	Data Missing
Lawn	<$25,000	25	308	9	7
	$25,000-$99,999	74	377	16	4
	$100,000-$499,999	73	271	4	12
	$500,000-$999,999	21	7	0	0
	$1,000,000-$5,000,000	14	4	0	4
	>$5,000,000	1	0	0	0
	Data Missing	4	11	0	32
		212	978	29	58
Tree	<$25,000	34	455	5	4
	$25,000-$99,999	77	334	5	0
	$100,000-$499,999	95	271	5	9
	$500,000-$999,999	32	24	3	0
	$1,000,000-$5,000,000	5	58	2	0
	>$5,000,000	2	4	0	0
	Data Missing	0	45	0	21
		245	1,191	20	34
Tree and/or Lawn	<$25,000	71	708	0	23
	$25,000-$99,999	162	635	4	22
	$100,000-$499,999	196	559	4	9
	$500,000-$999,999	67	38	0	6
	$1,000,000-$5,000,000	22	44	0	0
	>$5,000,000	0	7	6	0
	Data Missing	56	177	0	217
		575	2,168	14	277
Structural	<$25,000	984	2,028	12	42
	$25,000-$99,999	1,363	1,055	23	42
	$100,000-$499,999	968	362	86	47
	$500,000-$999,999	135	17	0	27
	$1,000,000-$5,000,000	136	13	0	0
	>$5,000,000	7	10	10	5
	Data Missing	266	267	36	875
		3,859	3,752	167	1,038
Structural and Tree and/or Lawn	<$25,000	140	364	0	6
	$25,000-$99,999	289	483	5	21
	$100,000-$499,999	336	301	15	27
	$500,000-$999,999	77	49	6	0
	$1,000,000-$5,000,000	61	16	2	0
	>$5,000,000	37	6	0	0
	Data Missing	41	39	18	281
		980	1,258	47	335
Overall	<$25,000	1,253	3,863	25	82
	$25,000-$99,999	1,965	2,884	53	88
	$100,000-$499,999	1,668	1,764	114	104
	$500,000-$999,999	333	136	10	33
	$1,000,000-$5,000,000	237	135	5	4
	>$5,000,000	48	27	16	5
	Data Missing	367	539	54	1,427
		5,870	9,347	277	1,742

Table 15. Estimated Number of Reporting Aggregates with Subscriptions to Trade Journals in 1981, By Reporting Aggregate Size

Subscriptions	<$25,000	$25,000-$99,999	$100,000-$499,999	$500,000-$999,999	$1,000,000-$5,000,000	>$5,000,000	Data Missing	Overall
None	1,955	902	303	16	32	11	206	3,426
American Lawn Applicator	224	293	433	46	36	7	58	1,097
Arborage	65	224	170	62	13	42	7	582
Grounds Maintenance	503	718	994	198	181	54	60	2,707
Landscape & Turf	298	288	390	97	79	40	62	1,254
Landscape Industry	71	85	257	98	33	45	9	598
Lawn Care Industry	387	675	897	140	105	53	42	2,299
Pest Control	1,754	1,952	1,688	269	209	34	397	6,303
Pest Control Technology	1,149	1,745	1,623	191	169	18	374	5,269
Pest Management	502	1,074	1,169	154	120	21	224	3,264
Weeds, Trees, and Turf	780	1,187	1,472	268	213	59	176	4,155
Other	67	62	64	0	0	0	38	231
Nonresponse	96	89	44	19	4	10	1,487	1,748

Table 16. Number of Years in Business as of 1981, By Industry Sector and Size of Reporting Aggregate
Entries in the table represent the estimated number of reporting aggregates in each category.

Industry Sector	Reporting Aggregate Size (Gross Sales, in Dollars)	Number of Years in Business						
		<1	1-3	3-6	6-10	10-25	>25	No Response
Lawn	<$25,000	2	146	111	14	54	14	7
	$25,000-$99,999	0	74	182	137	64	4	10
	$100,000-$499,999	0	22	81	105	140	8	4
	$500,000-$999,999	0	0	12	7	5	4	0
	$1,000,000-$5,000,000	0	0	9	1	12	0	0
	>$5,000,000	0	0	0	0	1	0	0
	Data Missing	0	0	14	4	27	0	3
		2	242	409	267	304	31	23
Tree	<$25,000	9	119	131	66	129	37	6
	$25,000-$99,999	5	63	113	43	115	78	0
	$100,000-$499,999	4	26	63	81	118	78	8
	$500,000-$999,999	0	8	6	3	7	35	0
	$1,000,000-$5,000,000	0	0	0	32	14	2	17
	>$5,000,000	0	0	0	0	1	5	0
	Data Missing	0	0	7	27	8	25	0
		18	217	319	252	393	260	31
Tree and/or Lawn	<$25,000	23	119	258	104	211	72	14
	$25,000-$99,999	4	96	317	106	244	27	29
	$100,000-$499,999	0	92	301	151	119	83	22
	$500,000-$999,999	0	2	24	25	35	26	0
	$1,000,000-$5,000,000	0	0	5	15	33	12	0
	>$5,000,000	0	0	4	0	7	2	0
	Data Missing	14	54	60	29	93	101	100
		41	363	969	430	742	323	165

Table 16. Number of Years in Business as of 1981, By Industry Sector and Size of Reporting Aggregate
Entries in the table represent the estimated number of reporting aggregates in each category.

(continued)

Industry Sector	Reporting Aggregate Size (Gross Sales, in Dollars)	Number of Years in Business <1	1-3	3-6	6-10	10-25	>25	No Response
Structural	<$25,000	135	783	692	406	779	256	15
	$25,000-$99,999	47	155	549	441	848	392	50
	$100,000-$499,999	0	76	248	197	488	408	46
	$500,000-$999,999	0	4	9	23	52	91	0
	$1,000,000-$5,000,000	5	11	5	0	54	74	0
	>$5,000,000	0	6	0	2	14	9	1
	Data Missing	20	106	118	98	149	279	674
		206	1,142	1,622	1,166	2,385	1,509	785
Structural and	<$25,000	62	67	134	36	176	22	13
	$25,000-$99,999	0	179	176	116	228	98	0
	$100,000-$499,999	0	30	79	180	225	159	6
	$500,000-$999,999	0	2	4	38	60	28	0
	$1,000,000-$5,000,000	0	6	11	6	21	35	0
	>$5,000,000	0	0	4	0	38	1	0
	Data Missing	0	0	36	19	48	29	247
		62	283	444	395	796	373	266
Overall	<$25,000	232	1,235	1,326	625	1,349	402	54
	$25,000-$99,999	55	567	1,338	843	1,499	599	89
	$100,000-$499,999	4	246	773	714	1,091	736	86
	$500,000-$999,999	0	17	55	96	159	185	0
	$1,000,000-$5,000,000	5	16	29	54	135	123	17
	>$5,000,000	0	6	9	2	61	17	1
	Data Missing	34	160	234	176	325	434	1,023
		330	2,246	3,763	2,510	4,620	2,497	1,271

APPENDIX A

The NUPAS Questionnaire

RTI ID Number
Name
Street Address or P.O. Box
City, State ZIP
**Reference State: ______________ **
1981 Business License Number: __________

The information you provide will be held in strict confidence and the results will be reported only in statistical summaries. No information that would identify an individual or firm will be released or reported.

ALL QUESTIONS REFER COLLECTIVELY TO BUSINESS LOCATIONS OPERATING WITHIN THE REFERENCE STATE UNDER THE BUSINESS NAME IDENTIFIED ON THE ABOVE LABEL. SUCH BUSINESS LOCATIONS WITHIN THE STATE WILL HEREAFTER BE REFERRED TO AS THE "FIRM". PLEASE CIRCLE YOUR ANSWER AND FOLLOW THE APPROPRIATE ARROW OR ENTER THE INFORMATION IN THE SPACE PROVIDED.

A. FIRM IDENTIFICATION INFORMATION

1. Is the information printed on the above label complete and correct?

Yes . . . . 01 (GO TO Q.3)
No. 02

2. Correct or complete information as necessary:

Firm Name: ______________________________
Business Address or P.O. Box: ______________________________
City: ______________ State: ______ ZIP: __________
Current Business License Number: ______________
(GO TO Q.3)

3. Does your firm furnish pest control services on a commercial basis (i.e., for a fee)?

Yes . . . . 01 (GO TO Q.4)
No. 02

STOP. THANK YOU FOR YOUR TIME. RETURN THE QUESTIONNAIRE IN THE ENVELOPE PROVIDED.

4. How long has your firm provided pest control services in the reference state identified on the above label?

Length of time: ______________________

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5. How many business offices or locations does your firm have within the reference state?

Number: ______________________________

6. What is the service area of your firm?

Multiple states . . . . 01 → (How many? _______)
Single state, all counties. 02
Single state, multiple counties . . . . . 03 → (How many? _______)
Single county 04
Don't know. . . . . DK

7. Does the ownership of this firm offer pest control services through any firms having other names and/or locations?

Yes 01
No. 02
Don't know. . . . . DK

8. During the past twelve months, has this firm merged with any other firm(s) or split to form one or more firms operating within the reference state identified on the above label?

Yes, merged 01
Yes, split. 02
Yes, both 03
Neither 04
Don't know. . . . . DK

9. If a 1981 Business License Number appears on the above label, do all business locations operating within the reference state under this license number have the same business name as that listed on the label?

Yes 01
No. 02
No Business License Number on label . . . 03
Don't know. . . . . DK

B. PERSONNEL INFORMATION

10. Using the following categories, please enter the number of employees associated with business locations operating within the reference state under the firm name identified on the above label. If your work varies seasonally, please express these as averages. (IF NONE, ENTER ZERO.)

a.	Full-time service technicians	________
b.	Part-time service technicians	________
c.	Sales representatives/inspectors.	________
d.	Managers/supervisors.	________
e.	Clerical.	________
f.	Other	________
g.	TOTAL EMPLOYEES	________

11. How many of your total employees are certified or licensed to apply pesticides by the reference state identified on the above label?

Number of employees: ____________________

12. Are any of your employees certified or licensed to apply pesticides in any other state(s)?

Yes 01

No. . . . . 02 } (GO TO Q.14)

Don't know. . . . DK } (GO TO Q.14)

13. Was this employee certification or licensing outside the reference state a result of...

formal examination? 01

reciprocity? 02

Other (SPECIFY____________________

____________________________). 03

Don't know . . . . DK

(GO TO Q.14)

14. In which of the following national organizations does your firm or its employees have membership? (CIRCLE ALL THAT APPLY.)

None. 00

National Pest Control Association, Inc. . 01

National Arborist Association, Inc. . . . 02

Professional Lawn Care Association of America, Inc.. 03

Other national pest control trade or professional organizations (SPECIFY BELOW). 04

____

____

15. Is your firm or any of its employees a member of any state or regional pest control trade organizations?

Yes 01

No. . . . . 02 } (GO TO Q.17)
Don't know. . . . DK }

16. Please list these organizations:

____

____

____

____

(GO TO Q.17)

17. To which of the following national pest control trade magazines does your firm or any of its employees subscribe? (CIRCLE ALL THAT APPLY.)

None	00
American Lawn Applicator	01
Arborage	02
Grounds Maintenance	03
Landscape and Turf	04
Landscape Industry	05
Lawn Care Industry	06
Pest Control	07
Pest Control Technology	08
Pest Management	09
Weeds, Trees and Turf	10
Other (SPECIFY BELOW)	11

____

____

____

C. PESTICIDE SALES INFORMATION

The questions in this section concern sales volume during calendar year 1981 or your most recent fiscal year. Guidelines for furnishing this information include:

- Sales volume information for calendar year 1981 is preferred.
- Report all information for the same time period. Please show any variations in the appropriate margin(s).
- Information requested is for all business locations operating within the reference state under the firm name identified on the above label. If this information can only be reported at another level (e.g., information available from parent company for entire region/ state and not for firm identified by the above label), check this box → ☐ and go to Question 26.

18. What were the total gross sales of your firm for all activities in 1981 (or your most recent fiscal year)?

Less than $25,000	01
$25,000 to $49,999	02
$50,000 to $99,999	03
$100,000 to $199,999	04
$200,000 to $499,999	05
$500,000 to $999,999	06
$1,000,000 to $5,000,000	07
Over $5,000,000	08

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19. What were your total sales during 1981 (or most recent fiscal year) for pest control (including termite) services only (i.e., exclude retail product sales, tree trimming, etc.)?

Less than $25,000	01
$25,000 to $49,999	02
$50,000 to $99,999	03
$100,000 to $199,999	04
$200,000 to $499,999	05
$500,000 to $999,999	06
$1,000,000 to $5,000,000	07
Over $5,000,000	08

20. What percent of your gross sales from pest control services (including termite) for 1981 (or your most recent fiscal year) came from the following sources? How many accounts are in each group? (IF NONE, ENTER ZERO. IF EXACT FIGURES ARE UNAVAILABLE, PLEASE PROVIDE YOUR BEST ESTIMATE.)

	Percent	Number of Accounts
a. Residential:		
Single Family Structures (detached houses, individual living quarters, etc.).	______%	______
Multiple Family Structures (apartment buildings, condominium complexes, etc.)	______%	______
b. Institutional (schools, health care facilities, prisons, etc.) . .	______%	______
c. Commercial Food Processing Areas (hotels, restaurants, bakeries, etc.)	______%	______
d. Industrial/Business (offices, warehouses, factories, malls, recreational areas, etc.)	______%	______
e. Right of Way (roads, transmission lines or pipelines, railroads, etc.).	______%	______
f. Commercial Agricultural	______%	______
g. Other (SPECIFY ______________ ______________________) . .	______%	______
	100 %	

21. What percent of your gross sales for 1981 or your most recent fiscal year came from each of the following? (IF NONE, ENTER ZERO. IF EXACT FIGURES ARE UNAVAILABLE, PLEASE PROVIDE YOUR BEST ESTIMATE.)

Lawn and Turf . . . . ______%

Tree, Shrub, and Ornamental . . . . ______%

Termites and Other Wood Destroyers. . . . . . ______%

Commodity Fumigations . . . . ______%

General Pest Control. . . . . ______%

Other (e.g., Pesticide Sales) . . . . ______%

100 %

D. PESTICIDE USAGE INFORMATION

22. The questions in this section concern total pesticide products purchased for usage during calendar year 1981 or your most recent fiscal year. Guidelines for furnishing this information include:

- Usage information for calendar year 1981 is preferred.
- Products should be identified as in the two examples below by EPA Reg. Number OR by complete product name and formulation (if EPA Reg. Number not available). Total amounts used should show units of measure (e.g., pounds, gallons, etc.). Be as specific in listing this information as you would if ordering from your supplier.
- Information requested is for all business locations operating within the reference state under the firm name identified on the above label. If this information can only be reported at another level (e.g., information available from parent company for entire region/state and not for firm identified by the above label), check this box → ☐ and go to Question 26.

Complete Pesticide Product Name	Formulation	EPA Reg. No.	(CIRCLE ONE) Ready to Use OR Concentrate	Total Amount Purchased Product Used
Dursban	2E	7122-68	R [✓ C]	40 gallons
Talon	G	10182-39	[✓ R] C	120 pounds
1.			R C	
2.			R C	
3.			R C	
4.			R C	
5.			R C	
6.			R C	
7.			R C	
8.			R C	
9.			R C	

(Continued on next page)

Complete Pesticide Product Name	Formulation	EPA Reg. No.	(CIRCLE ONE) Ready to Use	OR	Concen-trate	Total Amount Purchased Product Used
10.			R		C	
11.			R		C	
12.			R		C	
13.			R		C	
14.			R		C	
15.			R		C	
16.			R		C	
17.			R		C	
18.			R		C	
19.			R		C	
20.			R		C	
21.			R		C	
22.			R		C	
23.			R		C	
24.			R		C	
25.			R		C	
26.			R		C	
27.			R		C	
28.			R		C	

IF MORE SPACE IS NEEDED, CHECK THIS BOX → ☐ AND ENCLOSE ADDITIONAL SHEETS LISTING THE SAME INFORMATION AS ABOVE FOR EACH PRODUCT.

E. GENERAL INFORMATION

23. Is the information reported in this questionnaire for 1981?

Yes, 1981 . . . . 01 (GO TO Q.25)
No, other fiscal year 02

24. Dates of fiscal year:

FROM: ____________ (Month) 19____ (Yr.) TO: ____________ (Month) 19____ (Yr.)

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(GO TO Q.25)

25. Companies use many different kinds of accounting and record keeping systems. What record system did you use to furnish the information in Question 22?

Service records 01
Purchase records. 02
Other (SPECIFY BELOW) 03

____

____

26. Please indicate what problems you had (if any) in furnishing the requested information.

____

____

____

____

____

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27. We may, in the future, be interested in collecting additional product-specific information concerning target pest, product effectiveness, season of use, application site and equipment, safety precautions used, and label comprehension. Would you be willing and able to provide such information?

Yes, willing and able	01
Yes, willing but unable	02
No, not willing	03

28. In case clarification is needed for certain responses, please enter the name and business telephone number of a contact person in your firm. Remember, this information will never be reported or associated with your response.

Name: ______________________________

Telephone (________) ______________________
(Area Code)

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APPENDIX B.

ESTIMATES OF NATIONAL USAGE OF
ACTIVE INGREDIENTS IN 1981,
SORTED BY NUMBER OF POUNDS USED.
RSE = RELATIVE STANDARD ERROR.

OBS	CHEMCODE	CHEMICAL	POUNDS	RSE
1	63503	REFINED PETROLEUM HYDROCARBONS	6195909	8.9882
2	58201	CHLORDANE	3626095	4.5132
3	6501	AROMATIC PETROLEUM DERIVATIVE SOLVENT	3287738	7.1633
4	42003	ETHYLENE DICHLORIDE	3173050	19.0113
5	86802	DIMETHYLBENZENE	3128718	37.4182
6	78003	SULFURYL FLUORIDE	2688325	41.4092
7	57801	DIAZINON	1661691	5.6624
8	53201	METHYL BROMIDE	1618251	16.1834
9	59101	CHLORPYRIFOS	1611396	18.1453
10	86803	XYLENE RANGE AROMATIC SOLVENT	1603882	5.2594
11	9801	BETASAN	1363779	6.1006
12	16501	CARBON TETRACHLORIDE	1348625	18.9925
13	44801	HEPTACHLOR	1199746	6.6449
14	80803	ATRAZINE	1058175	36.5838
15	30019	DIETHYLAMINE 2,4-DICHLOROPHENOXYACETATE	1033077	6.4247
16	78701	DACTHAL	1027221	6.3243
17	56801	CARBARYL	852503	5.2748
18	34001	METHOXYCHLOR	784157	51.6426
19	6601	PETROLEUM DERIVED AROMATIC HYDROCARBONS	704339	12.0239
20	45101	ALDRIN	704274	12.2734
21	57701	MALATHION	648526	5.4431
22	35505	DIURON	460133	35.9459
23	12301	HYVAR X	408951	40.1990
24	11104	SODIUM METABORATE	339496	45.3466
25	73301	SODIUM CHLORATE	282565	43.6950
26	31519	DIMETHYLAMINE 2-(2-METHYL-4-CHLOROPHENOX	262604	3.7259
27	42002	ETHYLENE DIBROMIDE	255522	18.3034
28	84001	DDVP	247356	30.4409
29	30035	TRIISOPROPANOLAMINE 2,4-DICHLOROPHENOXYA	242335	48.7106
30	66501	ALUMINUM PHOSPHIDE	198338	22.4055
31	80807	SIMAZINE	184333	11.1793
32	105201	BENDIOCARB	181804	21.3267
33	57501	PARATHION	164065	45.8105
34	29802	DIMETHYLAMINE DICAMBA	158388	9.4571
35	77601	SULFUR DIOXIDE	147312	19.0168
36	108801	METOLACHLOR	142516	47.8691
37	10501	DICOFOL	141818	25.6945
38	80804	PROMETON	141296	31.6475
39	90501	ALACHLOR	140356	50.7496
40	11402	POLYBUTENE	139185	44.5147
41	30056	BUTYL 2,4-DICHLOROPHENOXYACETATE	138960	38.5582
42	57901	TRICHLORFON	127021	9.8797
43	31516	DIETHANOLAMINE 2-(2-METHYL-4-CHLOROPHENO	121980	13.4752
44	80501	TOXAPHENE	120562	21.3396
45	30053	BUTOXYETHYL 2,4-DICHLOROPHENOXYACETATE	119958	38.8740
46	31453	BUTOXYETHYL 2-(2,4-DICHLOROPHENOXY)PROPI	117798	38.8757
47	38904	ENDOTHALL, DIPOTASSIUM SALT OF	116016	42.2232
48	79101	ASPON	103125	0.2063
49	32201	DIQUAT DIBROMIDE	97083	37.3954
50	84301	BENEFIN	90581	19.4033
51	67501	PIPERONYL BUTOXIDE	86652	13.7427
52	103601	ROUNDUP	85484	9.4959

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OBS	CHEMCODE	CHEMICAL	POUNDS	RSE
53	9001	LINDANE	82033	7.5446
54	103301	ORTHENE	81487	12.9439
55	63001	PENTACHLOROPHENOL	77691	50.5551
56	24401	COPPER SULFATE PENTAHYDRATE	75282	50.7420
57	57201	THIMET	68873	43.0894
58	30016	DIETHANOLAMINE 2,4-DICHLORPHENOXYACETATE	65083	12.7533
59	11001	BORIC ACID	63068	23.3448
60	5102	PICLORAM, TRIISOPROPANOLAMINE SALT OF	62420	48.7106
61	113601	SAFROTIN	55577	32.4539
62	34902	FERRIC SULFATE	53431	39.1779
63	47802	BAYGON	51691	11.5274
64	105501	TEBUTHIURON	49383	38.0647
65	81901	BRAVO	47762	5.0067
66	99101	BENLATE	46182	4.9749
67	13803	MONOSODIUM METHANEARSONATE	42978	19.0118
68	90601	FURADAN	41320	55.2080
69	104201	SURFLAN	40099	38.8600
70	57001	OCTYL BICYCLOHEPTENE DICARBOXIMIDE	38819	2.4896
71	4401	AMITROLE (3-AMINO-S-TRIAZOLE)	36644	26.9166
72	61601	PARAQUAT DICHLORIDE	35111	24.2015
73	14506	ZINEB	34154	17.6450
74	31503	POTASSIUM 2-(2-METHYL-4-CHLOROPHENOXY)PR	34065	28.6433
75	35001	DIMETHOATE	33367	15.6220
76	14505	MANEB	32433	17.5529
77	63502	MINERAL OIL, SEAL OR WHITE	31556	19.2731
78	23102	COPPER NAPHTHENATE	31257	21.2968
79	81501	CHLOROPICRIN	31085	30.2294
80	41101	MOCAP	26468	26.2936
81	109401	ISOFENPHOS	26222	15.2484
82	63506	MINERAL SPIRITS (ODORLESS)	25902	23.6833
83	35509	SIDURON	24580	16.4642
84	69004	PYRETHRIN COILS	23477	35.7415
85	58301	RONNEL	22755	14.2664
86	116001	TRICLOPYR	22117	38.4880
87	63501	KEROSENE	21223	14.3748
88	81301	CAPTAN	21089	13.9913
89	56502	PCNB	20931	17.6128
90	6602	HEAVY AROMATIC NAPHTHA	20580	14.9785
91	505200	ISOPARAFFINIC HYDROCARBONS	19800	11.0000
92	69001	PYRETHRINS	18777	7.4806
93	75202	SODIUM FLUORIDE	17686	30.5274
94	30010	DICHLOROPHENOXYACETIC ACID, ALKANOLAMINE	17263	37.9504
95	72602	SILICA GEL	17212	14.0545
96	41401	EPTAM	16994	24.0909
97	89001	ZINC SULFATE	16900	49.1919
98	30063	DICHLOROPHENOXYACETIC ACID, OCTYL ESTER	15618	24.8960
99	79801	THIRAM (TETRAMETHTLTHIURAM DISULFIDE)	14767	23.7620
100	78501	TETRACHLOROETHYLENE	14590	9.2883
101	58702	METASYSTOX-R	14297	15.0844
102	77501	SULFUR	14202	33.4088
103	53001	METALDEHYDE	14048	56.0886
104	59201	PHOSMET	13573	24.0296

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OBS	CHEMCODE	CHEMICAL	POUNDS	RSE
105	27401	DICHLOROBENZONITRILE	12190	30.9567
106	67002	PINE OIL	11599	11.2319
107	14504	EBDC, AS A COORDINATION PRODUCT	11143	15.5886
108	41701	DYFONATE	10674	40.1205
109	106701	FOSAMINE AMMONIUM	10524	53.1096
110	30501	MCPA	10443	72.1120
111	19201	MCPB	10245	73.4971
112	101701	PRONAMIDE	10072	24.8567
113	38905	ENDOTHALL	9994	45.7329
114	103001	DEVRINOL	9548	26.1066
115	37801	DIOXATHION	9309	14.9785
116	11403	POLYISOBUTYLENE	8744	22.2702
117	13	TRICHOLROFLUOROMETHANE	7974	10.1734
118	14	DICHLORO DIFLUORO METHANE	7974	10.1734
119	34401	NALED	7939	49.1218
120	12302	BROMACIL, LITHIUM SALT OF	7571	14.9969
121	30072	PROPYLENE GLYCOL BUTYL ETHER 2,4-DICHLOR	7264	52.2824
122	58001	GUTHION	7089	16.2781
123	39003	METAM-SODIUM	7056	53.0762
124	5501	AMMATE	6998	8.6594
125	88601	ZINC PHOSPHIDE	6965	19.6061
126	32501	DISULFOTON	6715	13.6258
127	81101	TRICHLOROBENZENE	6214	47.8490
128	53301	BAYTEX	6208	34.7154
129	41405	SUTAN	5958	0.0000
130	63003	SODIUM PENTACHLOROPHENATE	5854	86.3281
131	29801	DICAMBA(3,6-DICHLORO-O-ANISIC ACID)	5614	28.3025
132	82606	AMMONIUM 2,3,6-TRICHLOROPHENYLACETATE	5505	65.2890
133	8101	BASIC COPPER SULFATE	5497	27.5590
134	116002	TRICLOPYR, TRIETHYLAMINE SALT OF	5476	57.8362
135	44301	DODINE (DODECYLGUANIDINE ACETATE)	5418	24.8844
136	97701	PHOSALONE	5079	26.5384
137	76702	CALCIUM POLYSULFIDE	4975	30.4284
138	36101	TRIFLURALIN	4919	26.1437
139	28902	DALAPON, SODIUM SALT OF	4869	26.2169
140	61501	PARADICHLOROBENZENE	4670	29.0508
141	34805	ZIRAM (ZINC DIMETHYL DITHIOCARBAMATE)	4615	33.7207
142	58401	ETHION	4608	9.4379
143	30029	CICHLOROPHENOXYACETIC ACID, N-OLEYL-1,3-	4580	26.1172
144	42004	METHYLENE CHLORIDE	4386	10.1734
145	80301	DIETHYL-META-TOLUAMIDE AND OTHER ISOMERS	4359	28.8922
146	12502	SODIUM CACODYLATE	4228	26.6521
147	97801	RESMETHRIN	4200	14.7819
148	6902	SODIUM POLYSULFIDE	4074	48.3236
149	30511	MCPA, DIETHANOLAMINE SALT OF	3949	56.0028
150	30001	DICHLOROPHENOXYACETIC ACID	3619	26.0310
151	10301	NAPHTHOL	3490	50.3658
152	27501	DIENOCHLOR	3457	42.4420
153	109001	OXADIAZON	3344	18.2645
154	13603	SODIUM ARSENITE	3318	37.2717
155	11501	BUTOXYETHANOL	3285	49.2476
156	23401	COPPER HYDROXIDE	3079	19.7678

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OBS	CHEMCODE	CHEMICAL	POUNDS	RSE
157	57601	SYSTOX	2976	35.6607
158	7501	BARIUM CARBONATE	2924	59.3870
159	109801	IPRODINE	2637	12.6362
160	86002	WARFARIN	2529	14.9076
161	54001	METHYLATED AROMATIC PETROLEUM DERIVATIVE	2484	52.1042
162	68602	POLYFROPYLENE GLYCOL	2274	58.9878
163	72605	SILICON DIOXIDE	2272	11.1685
164	23104	COPPER SALTS OF FATTY AND ROSIN ACIDS	2253	32.4638
165	33901	DIACETONE ALCOHOL	2222	40.7244
166	102001	METHYL THIOPHANATE	2072	38.7792
167	11102	BORAX	2058	31.1396
168	74001	CALCIUM CYANIDE	1995	15.2610
169	35506	LINURON	1976	10.8772
170	103401	THIOPHANATE-ETHYL	1963	37.1356
171	80811	DYRENE	1892	18.7907
172	107201	VELPAR	1798	32.4174
173	30033	DICHLOROPHENOXYACETIC ACID, TRIETHANOLAM	1664	67.7605
174	1501	ETHYL ALCOHOL	1610	0.0000
175	46901	BUTOXY...ETHOXYETHANOL-IODINE COMPLEX	1587	65.2890
176	13802	DSMA	1581	23.4130
177	81601	FOLPET	1402	29.9041
178	31605	SOYBEAN OIL	1368	81.5513
179	60102	HYPOPHOSPHOROUS 2-(4-THIAZOLYL)BENZIMIDA	1294	21.6115
180	11901	BUTOXYPOLYPROPYLENE GLYCOL	1245	11.8923
181	35701	BUTONATE	1176	36.3375
182	34801	FERBAM	1167	62.3097
183	23503	COPPER OXYCHLORIDE SULFATE	1141	37.3526
184	79401	ENDOSULFAN	1083	20.1368
185	64104	SODIUM OTRHOPHENYLPHENATE	1029	18.8359
186	104601	VENDEX	1017	41.2032
187	41601	ENDRIN	957	36.1406
188	77702	PROPIONIC ACID	918	64.1872
189	31563	ISOOCTYL 2-(2-METHYL-4-CHLOROPHENOXY)PRO	915	25.4537
190	36601	DIPHENAMID	895	54.4027
191	97601	OMITE	861	53.7191
192	83501	TRIETHYLENE GLYCOL	850	1.7883
193	79009	SOAP	847	26.0525
194	8901	BHC	834	52.1042
195	22101	CRESYLIC ACID, COAL TAR ACIDS & PHENOLS	821	54.5243
196	6401	BACILLUS THURINGIENSIS VAR. ISRAELENSIS	805	20.3557
197	81701	DIFOLATAN	780	30.3356
198	47501	PROPANOL	774	57.3698
199	69129	HYAMINE 2389	757	70.3476
200	71004	CUBE RESINS OTHER THAN ROTENONE	755	23.9211
201	25902	CYCLOHEXANONE	738	13.0481
202	12501	CACODYLIC ACID	722	26.6454
203	101601	CYHEXATIN (TRICYCLOHEXYLHYDROXYSTANNANE)	667	28.8305
204	114002	MEFLUIDIDE, DIETHANOLAMINE SALT OF	632	34.1097
205	100101	BLADEX	626	48.8284
206	5104	PICLORAM, POTASSIUM SALT OF	624	38.0421
207	90301	METHOMYL	601	1.8681
208	35201	DICROTOPHOS	599	29.7536

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OBS	CHEMCODE	CHEMICAL	POUNDS	RSE
209	84701	TERRAZOLE	588	28.6153
210	28903	DALAPON,MAGNESIUM SALT OF	575	28.9545
211	30563	MCPA, ISOOCTYL ESTER OF	572	23.5222
212	103901	BENTAZON,SODIUM SALT OF	567	19.2779
213	12902	CADMIUM CHLORIDE	552	77.7355
214	100501	MESUROL	540	33.9772
215	28801	CHLOROBENZILATE	499	22.0901
216	105401	METHOPRENE	497	19.4136
217	99102	LIGNASAN BLP	470	58.3112
218	98301	TEMIK	467	34.3555
219	101101	METRIBUZIN	457	39.9182
220	16401	CARBON DISULFIDE	445	46.1033
221	103801	OXAMYL	404	33.0106
222	71003	ROTENONE	398	22.7778
223	30052	DICHLOROPHENOXYACETIC ACID, BUTOXYETHOXY	397	56.3961
224	106401	AVENGE	391	50.1219
225	80104	SODIUM THIOSULFATE	388	48.3236
226	27301	CHOLRONEB	360	34.3280
227	36001	KARATHANE	360	38.5613
228	13804	OCTYLAMMONIUM METHANEARSONATE	358	32.2463
229	13805	DODECYLAMMONIUM METHANEARSONATE	358	32.2463
230	35302	BROMOXYNIL OCTANOATE	355	48.0871
231	19101	PROPACHLOR	345	70.6977
232	30004	SODIUM 2,4-DICHLOROPHENOXYACETATE	329	38.4303
233	43302	MGK REPELLENT R-11	311	28.8922
234	47201	DIPROPYL ISOCIMCHOMERONATE	311	28.8922
235	80813	IGRAN	305	61.9475
236	69153	ALKYL* TRIMETHYL AMMONIUM BROMIDE *(95%	293	53.8742
237	107901	TRIFORINE	282	31.1499
238	106601	PROFLURALIN	266	0.0000
239	109901	TRIADIMEFON	237	46.0138
240	109701	PERMETHRIN	221	43.8864
241	98701	BETANAL	217	56.3961
242	67704	PIVAL, SODIUM SALT OF	215	34.6203
243	42301	ETHYLENE OXIDE	214	49.7400
244	67707	CHLOROPHACINONE	211	13.1261
245	29803	DICAMBA,DIETHANOLAMINE SALT OF	210	34.4533
246	68604	DIPROPYLENE GLYCOL	201	0.0000
247	25901	CYCLOHEXANE	190	14.9785
248	69201	AMINOPYRIDINE	186	24.0657
249	22501	COPPER	154	38.3616
250	10002	LETHANE 384	153	45.0266
251	75003	SODIUM FLUOROACETATE	149	36.6099
252	83601	TRIPHENYLTIN HYDROXIDE	146	40.0076
253	75301	AMMONIUM FLUOSILICATE	137	31.0188
254	83701	TETRACHLORVINPHOS	137	51.2608
255	30055	BUTOXYPROPYL 2,4-DICHLOROPHENOXYACETATE	135	42.0431
256	86001	FUMARIN	135	23.9266
257	40501	CITRUS OIL	131	55.5488
258	76901	STRYCHNINE	125	16.4875
259	38903	ENDOTHALL, DISODIUM SALT OF	113	51.6866
260	99601	FLOREL	109	56.9819

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OBS	CHEMCODE	CHEMICAL	POUNDS	RSE
261	51502	MALEIC HYDRAZIDE, DIETHANOLAMINE SALT OF	106	47.3916
262	17601	CARBYNE	99	70.6977
263	43601	GLYODIN	99	79.6139
264	31608	CASTOR OIL	82	63.4619
265	82056	BUTYL 2,4,5-TRICHLOROPHENOXYACETATE	81	72.4108
266	43401	ACTIDIONE	75	41.8150
267	67703	PIVAL	69	10.1628
268	54101	MORESTAN	65	46.5831
269	90202	OXYCARBOXIN	64	42.9129
270	76406	TRISODIUM PHOSPHATE	63	70.3476
271	82555	SILVEX, BUTOXYPROPYL ESTER OF	63	42.0431
272	63005	SODIUM TETRACHLOROPHENATES	62	53.7659
273	31602	COTTONSEED OIL	61	33.9243
274	67701	DIPHACINONE	59	4.6146
275	24403	COPPER TRIETHANOLAMINE COMPLEX	58	58.3888
276	82519	DIETHYLAMINE SILVEX	51	56.3961
277	56704	TOBACCO DUST	50	64.9771
278	54002	METHYL NAPTHALENES	48	41.8306
279	46909	POLYETHOXY...ETHOXYETHANOL-IODINE COMPLE	47	65.2890
280	69104	ALKYL* DIMETHYL BENZYL AMMONIUM CHLORIDE	47	52.9276
281	69154	ALKYL* DIMETHYL ETHYLBENZYL AMMONIUM CHL	47	52.9276
282	31501	MCPP	46	34.1782
283	69183	WSCP	44	0.0000
284	111601	OXYFLUORFEN	44	72.4108
285	22001	ASPHALT	42	0.0000
286	68603	PROPYLENE GLYCOL	42	33.8787
287	30065	ISOOCTYL(2-OCTYL) 2,4-DICHLOROPHENOXYACE	41	70.6126
288	6310	STREPTOMYCIN SULFATE	38	33.5845
289	42203	ETHYLENE GLYCOL	38	38.2340
290	112701	BRODIFACOUM	38	4.1885
291	14701	CALCIUM HYPOCHLORITE	35	58.9501
292	109301	FENVALERATE	32	53.7659
293	84201	BOMYL	29	0.0000
294	99401	GUM RESINS	29	63.4619
295	34201	LESAN	27	54.5931
296	35501	MONURON	26	35.2886
297	43801	GIBBERELLIC ACID	26	65.2890
298	82602	SODIUM 2,3,6-TRICHLOROPHENYLACETATE	25	52.5554
299	23304	COPPER OLEATE	24	35.1934
300	58301	CIODRIN	23	42.4518
301	107501	KINOFRENE	23	49.3864
302	12303	BROMACIL, SODIUM SALT OF	20	52.5554
303	118401	AMDRO	19	28.4585
304	69149	DIDECYL DIMETHYL AMMONIUM CHLORIDE	15	47.9208
305	106901	ASULAM (METHYL SULFANILYLCARBAMATE)	15	64.5037
306	109601	ATRINAL	15	42.1652
307	11002	BORIC OXIDE	14	61.9475
308	70801	RED SQUILL	14	52.6855
309	67705	DIPHACINONE, SODIUM SALT OF	13	13.5036
310	76104	SODIUM NITRATE	13	65.2890
311	82063	ISOOCTYL 2,4,5-TRICHLOROPHENOXYACETATE	13	79.9799
312	82565	ISOOCTYL SILVEX	13	70.6126

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OBS	CHEMCODE	CHEMICAL	POUNDS	RSE
313	13806	CALCIUM METHANEARSONATE	12	12.3000
314	31604	HYDROGENATED CASTOR OIL	12	25.7045
315	611	DRIED BLOOD	11	64.9771
316	4001	ALLETHRIN (ALLYL HOMOLOG OF CINERIN I)	11	88.0120
317	30030	OCTYLAMINE 2,4-DICHLOROPHENOXYACETATE	11	30.7369
318	55801	NAPHTHALENE	11	64.9771
319	99301	ASBESTOS	11	0.0000
320	169111	DIALKYL* DIMETHYL AMMONIUM BENTONITE *(A	11	56.0028
321	69140	ALKYL* DIMETHYL BENZYL AMMONIUM CHLORIDE	10	0.0000
322	56702	NICOTINE	9	40.7116
323	86004	FUMARIN, SODIUM SALT OF	8	18.7316
324	17302	TRICHLOROBENZOIC ACID	7	41.8778
325	77901	SULFAQUINOXALINE	7	21.1521
326	39107	TETRASODIUM ETHYLENEDIAMINETETRAACETATE	6	53.3775
327	99501	VEGETABLE WAX	6	63.4619
328	11301	NEMAGON (DBCP)	5	79.9799
329	16001	CARBON	5	65.2890
330	79202	TETRADIFON	5	63.3590
331	82563	SILVEX, ISOOCTYL(2-ETHYLHEXYL) ESTER OF	4	59.2327
332	69165	OCTYL DECYL DIMETHYL AMMONIUM CHLORIDE	3	0.0000
333	73506	SODIUM CARBONATE	3	53.3775
334	69166	DIOCTYL DIMETHYL AMMONIUM CHLORIDE	2	0.0000
335	72604	SODIUM METASILICATE	2	53.3775
336	66502	PHOSPHORUS	1	65.2890
337	98801	CHLORFLURENOL	1	48.3311
338	112001	BROMADIOLONE	1	11.0376

APPENDIX C.
ESTIMATES OF NATIONAL USAGE OF
ACTIVE INGREDIENTS IN 1981,
SORTED BY EPA CHEMICAL CODE
RSE = RELATIVE STANDARD ERROR.

CHEMCODE	CHEMICAL	POUNDS	RSE
13	TRICHOLROFLUOROMETHANE	7974	10.1734
14	DICHLORO DIFLUORO METHANE	7974	10.1734
611	DRIED BLOOD	11	64.9771
1501	ETHYL ALCOHOL	1610	0.0000
4001	ALLETHRIN (ALLYL HOMOLOG OF CINERIN I)	11	88.0120
4401	AMITROLE (3-AMINO-S-TRIAZOLE)	36644	26.9166
5102	PICLORAM, TRIISOPROPANOLAMINE SALT OF	62420	48.7106
5104	PICLORAM, POTASSIUM SALT OF	624	38.0421
5501	AMMATE	6998	8.6594
6310	STREPTOMYCIN SULFATE	38	33.5845
6401	BACILLUS THURINGIENSIS VAR. ISRAELENSIS	805	20.3557
6501	AROMATIC PETROLEUM DERIVATIVE SOLVENT	3287738	7.1633
6601	PETROLEUM DERIVED AROMATIC HYDROCARBONS	704339	12.0239
6602	HEAVY AROMATIC NAPHTHA	20580	14.9785
6902	SODIUM POLYSULFIDE	4074	48.3236
7501	BARIUM CARBONATE	2924	59.3870
8101	BASIC COPPER SULFATE	5497	27.5590
8901	BHC	834	52.1042
9001	LINDANE	82033	7.5446
9801	BETASAN	1363779	6.1006
10002	LETHANE 384	153	45.0266
10301	NAPHTHOL	3490	50.3658
10501	DICOFOL	141818	25.6945
11001	BORIC ACID	63068	23.3448
11002	BORIC OXIDE	14	61.9475
11102	BORAX	2058	31.1396
11104	SODIUM METABORATE	339496	45.3466
11301	NEMAGON (DBCP)	5	79.9799
11402	POLYBUTENE	139185	44.5147
11403	POLYISOBUTYLENE	8744	22.2702
11501	BUTOXYETHANOL	3285	49.2476
11901	BUTOXYPOLYPROPYLENE GLYCOL	1245	11.8923
12301	HYVAR X	408951	40.1990
12302	BROMACIL, LITHIUM SALT OF	7571	14.9969
12303	BROMACIL, SODIUM SALT OF	20	52.5554
12501	CACODYLIC ACID	722	26.6454
12502	SODIUM CACODYLATE	4228	26.6521
12902	CADMIUM CHLORIDE	552	77.7355
13603	SODIUM ARSENITE	3318	37.2717
13802	DSMA	1581	23.4130
13803	MONOSODIUM METHANEARSONATE	42978	19.0118
13804	OCTYLAMMONIUM METHANEARSONATE	358	32.2463
13805	DODECYLAMMONIUM METHANEARSONATE	358	32.2463
13806	CALCIUM METHANEARSONATE	12	12.3000
14504	EBDC, AS A COORDINATION PRODUCT	11143	15.5806
14505	MANEB	32433	17.5629
14506	ZINEB	34154	17.6450
14701	CALCIUM HYPOCHLORITE	35	58.9501
16001	CARBON	5	65.2890
16401	CARBON DISULFIDE	445	46.1033
16501	CARBON TETRACHLORIDE	1348625	18.9925
17302	TRICHLOROBENZOIC ACID	7	41.8778

APPENDIX C.
ESTIMATES OF NATIONAL USAGE OF
ACTIVE INGREDIENTS IN 1981,
SORTED BY EPA CHEMICAL CODE
RSE = RELATIVE STANDARD ERROR.

CHEMCODE	CHEMICAL	POUNDS	RSE
17601	CARBYNE	99	70.6977
19101	PROPACHLOR	345	70.6977
19201	MCPB	10245	73.4971
22001	ASPHALT	42	0.0000
22101	CRESYLIC ACID, COAL TAR ACIDS & PHENOLS	821	54.5243
22501	COPPER	154	38.3616
23102	COPPER NAPHTHENATE	31257	21.2968
23104	COPPER SALTS OF FATTY AND ROSIN ACIDS	2253	32.4638
23304	COPPER OLEATE	24	35.1934
23401	COPPER HYDROXIDE	3079	19.7678
23503	COPPER OXYCHLORIDE SULFATE	1141	37.3526
24401	COPPER SULFATE PENTAHYDRATE	75282	50.7420
24403	COPPER TRIETHANOLAMINE COMPLEX	58	58.3888
25901	CYCLOHEXANE	190	14.9785
25902	CYCLOHEXANONE	738	13.0481
27301	CHOLRONEB	360	34.3280
27401	DICHLOROBENZONITRILE	12190	30.9567
27501	DIENOCHLOR	3457	42.4420
28801	CHLOROBENZILATE	499	22.0901
28902	DALAPON, SODIUM SALT OF	4869	26.2169
28903	DALAPON,MAGNESIUM SALT OF	575	28.9545
29801	DICAMBA(3,6-DICHLORO-O-ANISIC ACID)	5614	28.3025
29802	DIMETHYLAMINE DICAMBA	158388	9.4571
29803	DICAMBA,DIETHANOLAMINE SALT OF	210	34.4533
30001	DICHLOROPHENOXYACETIC ACID	3619	26.0310
30004	SODIUM 2,4-DICHLOROPHENOXYACETATE	329	38.4303
30010	DICHLOROPHENOXYACETIC ACID, ALKANOLAMINE	17263	37.9504
30016	DIETHANOLAMINE 2,4-DICHLORPHENOXYACETATE	65083	12.7533
30019	DIETHYLAMINE 2,4-DICHLOROPHENOXYACETATE	1033077	6.4247
30029	CICHLOROPHENOXYACETIC ACID, N-OLEYL-1,3-	4580	26.1172
30030	OCTYLAMINE 2,4-DICHLOROPHENOXYACETATE	11	30.7369
30033	DICHLOROPHENOXYACETIC ACID, TRIETHANOLAM	1664	67.7605
30035	TRIISOPROPANOLAMINE 2,4-DICHLOROPHENOXYA	242335	48.7106
30052	DICHLOROPHENOXYACETIC ACID, BUTOXYETHOXY	397	56.3961
30053	BUTOXYETHYL 2,4-DICHLOROPHENOXYACETATE	119958	38.8740
30055	BUTOXYPROPYL 2,4-DICHLOROPHENOXYACETATE	135	42.0431
30056	BUTYL 2,4-DICHLOROPHENOXYACETATE	138960	38.5582
30063	DICHLOROPHENOXYACETIC ACID, OCTYL ESTER	15618	24.8960
30065	ISOOCTYL(2-OCTYL) 2,4-DICHLOROPHENOXYACE	41	70.6126
30072	PROPYLENE GLYCOL BUTYL ETHER 2,4-DICHLOR	7264	52.2824
30501	MCPA	10443	72.1120
30511	MCPA, DIETHANOLAMINE SALT OF	3949	56.0028
30563	MCPA, ISOOCTYL ESTER OF	572	23.5222
31453	BUTOXYETHYL 2-(2,4-DICHLOROPHENOXY)PROPI	117798	38.8757
31501	MCPP	46	34.1782
31503	POTASSIUM 2-(2-METHYL-4-CHLOROPHENOXY)PR	34065	28.6433
31516	DIETHANOLAMINE 2-(2-METHYL-4-CHLOROPHENO	121980	13.4752
31519	DIMETHYLAMINE 2-(2-METHYL-4-CHLOROPHENOX	262604	3.7259
31563	ISOOCTYL 2-(2-METHYL-4-CHLOROPHENOXY)PRO	915	25.4537
31602	COTTONSEED OIL	61	33.9243
31604	HYDROGENATED CASTOR OIL	12	25.7045
31605	SOYBEAN OIL	1368	81.5513

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APPENDIX C.
ESTIMATES OF NATIONAL USAGE OF ACTIVE INGREDIENTS IN 1981, SORTED BY EPA CHEMICAL CODE

RSE = RELATIVE STANDARD ERROR.

CHEMCODE	CHEMICAL	POUNDS	RSE
31608	CASTOR OIL	82	63.4619
32201	DIQUAT DIBROMIDE	97088	37.3954
32501	DISULFOTON	6715	13.6258
33901	DIACETONE ALCOHOL	2222	40.7244
34001	METHOXYCHLOR	784157	51.6426
34201	LESAN	27	54.5931
34401	NALED	7939	49.1218
34801	FERBAM	1167	62.3097
34805	ZIRAM (ZINC DIMETHYL DITHIOCARBAMATE)	4615	33.7207
34902	FERRIC SULFATE	53431	39.1779
35001	DIMETHOATE	33367	15.6220
35201	DICROTOPHOS	599	29.7536
35302	BROMOXYNIL OCTANOATE	355	48.0871
35501	MONURON	26	35.2886
35505	DIURON	460133	35.9459
35506	LINURON	1976	10.8772
35509	SIDURON	24580	16.4642
35701	BUTONATE	1176	36.3375
36001	KARATHANE	360	38.5613
36101	TRIFLURALIN	4919	26.1437
36601	DIPHENAMID	895	54.4027
37801	DIOXATHION	9309	14.9785
38903	ENDOTHALL, DISODIUM SALT OF	113	51.6866
38904	ENDOTHALL, DIPOTASSIUM SALT OF	116016	42.2232
38905	ENDOTHALL	9994	45.7329
39003	METAM-SODIUM	7056	53.0762
39107	TETRASODIUM ETHYLENEDIAMINETETRAACETATE	6	53.3775
40501	CITRUS OIL	131	55.5488
41101	MOCAP	26468	26.2936
41401	EPTAM	16994	24.0909
41405	SUTAN	5958	0.0000
41601	ENDRIN	957	36.1406
41701	DYFONATE	10674	40.1205
42002	ETHYLENE DIBROMIDE	255522	18.3034
42003	ETHYLENE DICHLORIDE	3173050	19.0113
42004	METHYLENE CHLORIDE	4386	10.1734
42203	ETHYLENE GLYCOL	38	38.2340
42301	ETHYLENE OXIDE	214	49.7400
43302	MGK REPELLENT R-11	311	28.8922
43401	ACTIDIONE	75	41.8150
43601	GLYODIN	99	79.6139
43801	GIBBERELLIC ACID	26	65.2890
44301	DODINE (DODECYLGUANIDINE ACETATE)	5418	24.8844
44801	HEPTACHLOR	1199746	6.6449
45101	ALDRIN	704274	12.2734
46901	BUTOXY...ETHOXYETHANOL-IODINE COMPLEX	1587	65.2890
46909	POLYETHOXY...ETHOXYETHANOL-IODINE COMPLE	47	65.2890
47201	DIPROPYL ISOCIMCHOMERONATE	311	28.8922
47501	PROPANOL	774	57.3698
47802	BAYGON	51691	11.5274
51502	MALEIC HYDRAZIDE, DIETHANOLAMINE SALT OF	106	47.3916
53001	METALDEHYDE	14048	56.0886

APPENDIX C.
ESTIMATES OF NATIONAL USAGE OF ACTIVE INGREDIENTS IN 1981, SORTED BY EPA CHEMICAL CODE
RSE = RELATIVE STANDARD ERROR.

CHEMCODE	CHEMICAL	POUNDS	RSE
53201	METHYL BROMIDE	1618251	16.1834
53301	BAYTEX	6208	34.7154
54001	METHYLATED AROMATIC PETROLEUM DERIVATIVE	2484	52.1042
54002	METHYL NAPTHALENES	48	41.8306
54101	MORESTAN	65	46.5831
55801	NAPHTHALENE	11	64.9771
56502	PCNB	20931	17.6128
56702	NICOTINE	9	40.7116
56704	TOBACCO DUST	50	64.9771
56801	CARBARYL	852503	5.2748
57001	OCTYL BICYCLOHEPTENE DICARBOXIMIDE	38819	2.4896
57201	THIMET	68873	43.0894
57501	PARATHION	164065	45.8105
57601	SYSTOX	2976	35.6607
57701	MALATHION	648526	5.4431
57801	DIAZINON	1661691	5.6624
57901	TRICHLORFON	127021	9.8797
58001	GUTHION	7089	16.2781
58201	CHLORDANE	3626095	4.5132
58301	RONNEL	22755	14.2664
58401	ETHION	4608	9.4379
58702	METASYSTOX-R	14297	15.0844
58801	CIODRIN	23	42.4518
59101	CHLORPYRIFOS	1611396	18.1453
59201	PHOSMET	13573	24.0296
60102	HYPOPHOSPHOROUS 2-(4-THIAZOLYL)BENZIMIDA	1294	21.6115
61501	PARADICHLOROBENZENE	4670	29.0508
61601	PARAQUAT DICHLORIDE	35111	24.2015
63001	PENTACHLOROPHENOL	77691	50.5551
63003	SODIUM PENTACHLOROPHENATE	5854	86.3281
63005	SODIUM TETRACHLOROPHENATES	62	53.7659
63501	KEROSENE	21223	14.3748
63502	MINERAL OIL, SEAL OR WHITE	31556	19.2731
63503	REFINED PETROLEUM HYDROCARBONS	6195909	8.9882
63506	MINERAL SPIRITS (ODORLESS)	25902	23.6833
64104	SODIUM OTRHOPHENYLPHENATE	1029	18.8359
66501	ALUMINUM PHOSPHIDE	198338	22.4055
66502	PHOSPHORUS	1	65.2890
67002	PINE OIL	11599	11.2319
67501	PIPERONYL BUTOXIDE	86652	13.7427
67701	DIPHACINONE	59	4.6146
67703	PIVAL	69	10.1628
67704	PIVAL, SODIUM SALT OF	215	34.6203
67705	DIPHACINONE, SODIUM SALT OF	13	13.5036
67707	CHLOROPHACINONE	211	13.1261
68602	POLYPROPYLENE GLYCOL	2274	58.9878
68603	PROPYLENE GLYCOL	42	33.8787
68604	DIPROPYLENE GLYCOL	201	0.0000
69001	PYRETHRINS	18777	7.4806
69004	PYRETHRIN COILS	23477	35.7415
69104	ALKYL* DIMETHYL BENZYL AMMONIUM CHLORIDE	47	52.9276
69129	HYAMINE 2389	757	70.3476

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APPENDIX C.
ESTIMATES OF NATIONAL USAGE OF ACTIVE INGREDIENTS IN 1981, SORTED BY EPA CHEMICAL CODE RSE = RELATIVE STANDARD ERROR.

CHEMCODE	CHEMICAL	POUNDS	RSE
69140	ALKYL* DIMETHYL BENZYL AMMONIUM CHLORIDE	10	0.0000
69149	DIDECYL DIMETHYL AMMONIUM CHLORIDE	15	47.9208
69153	ALKYL* TRIMETHYL AMMONIUM BROMIDE *(95%	293	53.8742
69154	ALKYL* DIMETHYL ETHYLBENZYL AMMONIUM CHL	47	52.9276
69165	OCTYL DECYL DIMETHYL AMMONIUM CHLORIDE	3	0.0000
69166	DIOCTYL DIMETHYL AMMONIUM CHLORIDE	2	0.0000
69183	WSCP	44	0.0000
69201	AMINOPYRIDINE	186	24.0657
70801	RED SQUILL	14	52.6855
71003	ROTENONE	398	22.7778
71004	CUBE RESINS OTHER THAN ROTENONE	755	23.9211
72602	SILICA GEL	17212	14.0545
72604	SODIUM METASILICATE	2	53.3775
72605	SILICON DIOXIDE	2272	11.1685
73301	SODIUM CHLORATE	282565	43.6950
73506	SODIUM CARBONATE	3	53.3775
74001	CALCIUM CYANIDE	1995	15.2610
75003	SODIUM FLUOROACETATE	149	36.6099
75202	SODIUM FLUORIDE	17686	30.5274
75301	AMMONIUM FLUOSILICATE	137	31.0188
76104	SODIUM NITRATE	13	65.2890
76406	TRISODIUM PHOSPHATE	63	70.3476
76702	CALCIUM POLYSULFIDE	4975	30.4284
76901	STRYCHNINE	125	16.4875
77501	SULFUR	14202	33.4088
77601	SULFUR DIOXIDE	147312	19.0168
77702	PROPIONIC ACID	918	64.1872
77901	SULFAQUINOXALINE	7	21.1521
78003	SULFURYL FLUORIDE	2688325	41.4092
78501	TETRACHLOROETHYLENE	14590	9.2883
78701	DACTHAL	1027221	6.3243
79009	SOAP	847	26.0525
79101	ASPON	103125	0.2063
79202	TETRADIFON	5	63.3590
79401	ENDOSULFAN	1083	20.1368
79801	THIRAM (TETRAMETHTLTHIURAM DISULFIDE)	14767	23.7620
80104	SODIUM THIOSULFATE	388	48.3236
80301	DIETHYL-META-TOLUAMIDE AND OTHER ISOMERS	4359	28.8922
80501	TOXAPHENE	120562	21.3396
80803	ATRAZINE	1058175	36.5838
80804	PROMETON	141296	31.6475
80807	SIMAZINE	184333	11.1793
80811	DYRENE	1892	18.7907
80813	IGRAN	305	61.9475
81101	TRICHLOROBENZENE	6214	47.8490
81301	CAPTAN	21089	13.9913
81501	CHLOROPICRIN	31085	30.2294
81601	FOLPET	1402	29.9041
81701	DIFOLATAN	780	30.3356
81901	BRAVO	47762	5.0067
82056	BUTYL 2,4,5-TRICHLOROPHENOXYACETATE	81	72.4108
82063	ISOOCTYL 2,4,5-TRICHLOROPHENOXYACETATE	13	79.9799

APPENDIX C.
ESTIMATES OF NATIONAL USAGE OF ACTIVE INGREDIENTS IN 1981, SORTED BY EPA CHEMICAL CODE
RSE = RELATIVE STANDARD ERROR.

CHEMCODE	CHEMICAL	POUNDS	RSE
82519	DIETHYLAMINE SILVEX	51	56.3961
82555	SILVEX, BUTOXYPROPYL ESTER OF	63	42.0431
82563	SILVEX, ISOOCTYL(2-ETHYLHEXYL) ESTER OF	4	59.2327
82565	ISOOCTYL SILVEX	13	70.6126
82602	SODIUM 2,3,6-TRICHLOROPHENYLACETATE	25	52.5554
82606	AMMONIUM 2,3,6-TRICHLOROPHENYLACETATE	5505	65.2890
83501	TRIETHYLENE GLYCOL	850	1.7883
83601	TRIPHENYLTIN HYDROXIDE	146	40.0076
83701	TETRACHLORVINPHOS	137	51.2608
84001	DDVP	247356	30.4409
84201	BOMYL	29	0.0000
84301	BENEFIN	90581	19.4033
84701	TERRAZOLE	538	28.6153
86001	FUMARIN	135	23.9266
86002	WARFARIN	2529	14.9076
86004	FUMARIN, SODIUM SALT OF	8	18.7316
86802	DIMETHYLBENZENE	3128718	37.4182
86803	XYLENE RANGE AROMATIC SOLVENT	1603882	5.2594
88601	ZINC PHOSPHIDE	6965	19.6061
89001	ZINC SULFATE	16900	49.1919
90202	OXYCARBOXIN	64	42.9129
90301	METHOMYL	601	1.8681
90501	ALACHLOR	140356	50.7496
90601	FURADAN	41320	55.2080
97601	OMITE	861	53.7191
97701	PHOSALONE	5079	26.5384
97801	RESMETHRIN	4200	14.7819
98301	TEMIK	467	34.3555
98701	BETANAL	217	56.3961
98801	CHLORFLURENOL	1	48.3311
99101	BENLATE	46182	4.9749
99102	LIGNASAN BLP	470	58.3112
99301	ASBESTOS	11	0.0000
99401	GUM RESINS	29	63.4619
99501	VEGETABLE WAX	6	63.4619
99801	FLOREL	109	56.9819
100101	BLADEX	626	48.8284
100501	MESUROL	540	33.9772
101101	METRIBUZIN	457	39.9182
101601	CYHEXATIN (TRICYCLOHEXYLHYDROXYSTANNANE)	667	28.8305
101701	PRONAMIDE	10072	24.8567
102001	METHYL THIOPHANATE	2072	38.7792
103001	DEVRINOL	9548	26.1066
103301	ORTHENE	81487	12.9439
103401	THIOPHANATE-ETHYL	1963	37.1356
103601	ROUNDUP	85484	9.4959
103801	OXAMYL	404	33.0106
103901	BENTAZON,SODIUM SALT OF	567	19.2779
104201	SURFLAN	40099	38.8600
104601	VENDEX	1017	41.2032
105201	BENDIOCARB	181804	21.3267
105401	METHOPRENE	497	19.4136

APPENDIX C.
ESTIMATES OF NATIONAL USAGE OF ACTIVE INGREDIENTS IN 1981, SORTED BY EPA CHEMICAL CODE
RSE = RELATIVE STANDARD ERROR.

CHEMCODE	CHEMICAL	POUNDS	RSE
105501	TEBUTHIURON	49383	38.0647
106401	AVENGE	391	50.1219
106601	PROFLURALIN	266	0.0000
106701	FOSAMINE AMMONIUM	10524	53.1096
106901	ASULAM (METHYL SULFANILYLCARBAMATE)	15	64.5037
107201	VELPAR	1798	32.4174
107501	KINOPRENE	23	49.3864
107901	TRIFORINE	282	31.1499
108801	METOLACHLOR	142516	47.8691
109001	OXADIAZON	3344	18.2645
109301	FENVALERATE	32	53.7659
109401	ISOFENPHOS	26222	15.2484
109601	ATRINAL	15	42.1652
109701	PERMETHRIN	221	43.8864
109801	IPRODINE	2637	12.6362
109901	TRIADIMEFON	237	46.0138
111601	OXYFLUORFEN	44	72.4108
112001	BROMADIOLONE	1	11.0376
112701	BRODIFACOUM	38	4.1885
113601	SAFROTIN	55577	32.4539
114002	MEFLUIDIDE, DIETHANOLAMINE SALT OF	632	34.1097
116001	TRICLOPYR	22117	38.4880
116002	TRICLOPYR, TRIETHYLAMINE SALT OF	5476	57.8362
118401	AMDRO	19	28.4585
169111	DIALKYL* DIMETHYL AMMONIUM BENTONITE *(A	11	56.0028
505200	ISOPARAFFINIC HYDROCARBONS	19800	11.0000

Appendix D. Relative Standard Errors of Summarized National Estimates of Active Ingredient Usage in 1981, By Product Class and Industry Sector

Product Class	Lawn	Tree	Tree and/or Lawn	Structural	Structural and Tree and/or Lawn	Overall
Fungicide	13.7	17.6	21.6	35.5	19.3	10.7
Herbicide	5.2	21.1	20.7	22.7	35.4	12.9
Insecticide	28.6	8.4	16.7	7.4	19.2	6.5
Microbicide	-	59.0	53.4	17.1	39.2	16.5
Vertebrate Pesticide	60.6	49.5	49.1	6.0	49.6	38.5
Overall	10.8	7.7	13.4	7.1	16.9	5.8

Appendix E

Relative Standard Errors of National and Regional Estimates of Active Ingredient Usage in 1981, By Product Class and Industry Sector

CHEMCODE	CHEMICAL	NATIONAL	REGION 1	REGION 2	REGION 3	REGION 4	REGION 5	REGION 6	REGION 7	REGION 8	REGION 9	REGION 10
		INDUSTRY SECTOR = LAWN			PRODUCT CLASS = FUNGICIDE							
81901	BRAVO	3.9	5.0	9.4	17.9	10.7	2.7	0.0	2.4	1.8	0.0	0.0
56502	PCNB	20.0	0.0	29.0	4.0	0.0	24.3	0.0	0.0	0.0	0.0	0.0
6601	PETRO. DER. AROM. HYDROCARBONS	88.3	59.9	-	90.4	-	-	-	-	-	-	-
14505	MANEB	28.0	58.3	50.0	35.0	47.1	38.0	0.0	56.2	0.0	0.0	0.0
99101	BENLATE	7.7	24.3	28.8	15.1	7.4	10.7	0.0	1.9	10.4	0.0	0.0
14504	DITHANE M-45	29.5	59.9	-	-	34.4	60.6	-	-	-	65.3	-
109801	IPRODINE	13.0	45.6	19.0	29.2	0.0	20.4	0.0	0.0	0.0	59.7	0.0
79801	THIRAM	39.4	-	56.4	51.3	-	51.3	-	-	-	65.3	-
80811	DYRENE	37.5	53.8	59.2	51.3	-	51.3	-	-	-	-	-
27301	CHOLRONEB	34.3	-	-	-	-	34.3	-	-	-	-	-
CLASS		13.7	21.6	29.2	48.8	11.3	11.6	0.0	4.1	2.9	37.9	0.0
		INDUSTRY SECTOR = LAWN			PRODUCT CLASS = HERBICIDE							
9801	BETASAN	4.8	7.8	9.1	5.0	15.2	8.4	0.3	6.1	0.0	41.2	0.0
78701	DACTHAL	6.5	0.7	6.3	0.9	0.0	11.4	0.3	26.0	0.2	31.2	0.0
30019	DIETHYLAMINE 2, 4-D	6.7	4.1	6.4	4.3	12.9	10.2	0.9	21.0	11.3	35.9	0.0
31519	DIMETHYLAMINE 2-(2-M-4-C)PROP.	3.6	6.7	3.0	2.4	3.7	6.7	1.3	4.1	12.7	31.7	0.0
29802	DIMETHYLAMINE DICAMBA	11.6	40.7	27.4	16.3	13.2	16.9	0.7	18.8	9.9	31.7	0.0
31516	DIETHANDLAMINE 2-(2-M-4-C)PRO.	15.5	57.0	30.1	29.1	47.5	19.5	-	69.1	-	65.3	-
80803	ATRAZINE	40.8	0.0	55.9	0.0	30.5	0.0	0.0	0.0	0.0	65.3	0.0
84301	BENEFIN	22.3	12.0	21.3	15.5	10.1	28.0	0.0	24.5	0.0	0.0	0.0
30016	DIETHANOLAMINE 2,4-DICHLORPHEN	14.7	58.4	26.5	29.1	47.5	18.8	-	69.1	-	65.3	-
31503	POTASSIUM 2-(2-M-4-C) PROPION.	30.8	59.9	33.4	36.8	-	38.3	-	-	-	-	-
CLASS		5.2	5.4	11.0	3.3	10.0	8.8	0.6	18.8	3.5	52.7	0.0
		INDUSTRY SECTOR = LAWN			PRODUCT CLASS = INSECTICIDE							
59101	CHLORPYRIFOS	39.9	6.5	20.4	7.2	19.1	50.6	0.0	19.6	14.7	52.0	0.0
6501	AROMATIC PETROLEUM DERIVATIVE	53.4	31.1	18.5	22.2	38.1	62.0	-	28.7	56.2	65.3	-
86803	XYLENE RANGE AROMATIC SOLVENT	4.4	5.9	22.4	6.8	4.4	5.7	0.0	20.7	11.3	0.0	0.0
57801	DIAZINON	6.5	9.5	37.8	9.3	17.0	6.4	0.0	22.8	15.6	45.9	0.0
57901	TRICHLORFON	10.8	2.7	11.3	6.3	7.8	16.7	0.0	30.8	0.0	0.0	0.0
84001	DDVP	66.3	-	59.2	67.5	34.8	66.7	-	-	-	64.9	-
79101	ASPON	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
86802	DIMETHYLBENZENE	24.0	51.6	59.2	40.9	35.1	30.2	-	33.7	44.7	65.3	-
109401	ISOFENPHOS	7.4	16.9	23.0	20.0	0.0	8.0	0.0	1.3	0.0	0.0	0.0
56801	CARBARYL	26.6	-	31.3	45.5	54.1	55.3	-	-	-	-	-
CLASS		28.6	4.8	22.3	6.0	16.7	42.0	0.0	13.1	10.6	30.9	0.0
SECTOR		10.8	5.0	11.5	4.6	9.6	18.1	0.4	13.9	5.2	47.1	0.0

CHEMCODE	CHEMICAL	NATIONAL	REGION 1	REGION 2	REGION 3	REGION 4	REGION 5	REGION 6	REGION 7	REGION 8	REGION 9	REGION 10
		INDUSTRY SECTOR = TREE			PRODUCT CLASS = FUNGICIDE							
6601	PETRO. DER. AROM. HYDROCARBONS	24.5	34.2	53.3	41.2	32.3	30.5	15.9	76.9	57.9	-	-
63001	PENTACHLOROPHENOL	72.4	-	-	-	-	72.4	-	72.4	-	-	-
99101	BENLATE	6.3	10.1	14.5	16.3	39.3	7.1	3.2	15.3	0.0	35.5	29.3
81301	CAPTAN	22.2	22.2	35.8	63.9	58.4	40.0	-	-	-	47.6	41.1
77501	SULFUR	46.8	-	-	45.5	80.0	-	-	-	-	-	63.4
14505	MANEB	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	52.6
79801	THIRAM	36.0	-	59.2	45.5	80.0	-	-	-	-	-	-
14506	ZINEB	15.8	42.0	22.4	27.5	27.3	30.1	15.0	42.9	-	49.5	-
44301	DODINE	32.4	-	-	-	61.7	73.6	-	-	-	52.9	40.0
23102	COPPER NAPHTHENATE	59.3	-	-	-	59.3	59.3	-	-	-	-	-
CLASS		17.6	25.6	42.7	32.0	24.6	24.0	10.8	67.6	50.3	37.5	36.9
		INDUSTRY SECTOR = TREE			PRODUCT CLASS = HERBICIDE							
30035	TRIISOPROPANOLAMINE 2,4-D	30.7	34.5	59.2	-	61.7	59.3	-	-	-	-	-
116001	TRICLOPYR	49.2	34.5	-	-	-	59.3	-	-	-	-	63.4
5102	PICLORAM, TRIISOPROPANOLAMINE	30.7	34.5	59.2	-	61.7	59.3	-	-	-	-	-
30063	OCTYL ESTER OF 2,4-D	33.0	34.5	-	-	61.4	67.2	-	-	-	78.3	-
34902	FERRIC SULFATE	63.4	-	-	-	-	-	-	-	-	-	63.4
106701	FOSAMINE AMMONIUM	59.1	33.8	59.2	-	-	-	-	-	-	-	-
11104	SODIUM METABORATE	50.0	-	-	-	50.0	-	-	-	-	-	-
12301	HYVAR X	44.6	-	59.2	-	-	-	-	-	-	65.3	63.4
80807	SIMAZINE	28.5	-	-	-	50.0	64.5	-	-	-	42.4	49.6
73301	SODIUM CHLORATE	50.0	-	-	-	50.0	-	-	-	-	-	-
CLASS		21.1	32.6	57.8	51.2	40.5	55.7	-	51.1	61.7	34.5	36.6
		INDUSTRY SECTOR = TREE			PRODUCT CLASS = INSECTICIDE							
63503	REFINED PETROLEUM HYDROCARBONS	12.4	31.4	13.1	25.9	32.6	24.8	17.4	24.9	-	49.6	36.3
86802	DIMETHYLBENZENE	14.3	15.3	22.8	18.5	17.8	32.4	10.7	14.6	30.8	43.3	52.0
56801	CARBARYL	9.5	17.4	13.4	22.9	31.4	16.6	30.2	27.3	31.2	32.2	40.8
34001	METHOXYCHLOR	17.0	17.1	27.6	32.1	11.6	38.0	6.8	26.2	53.7	-	44.7
57801	DIAZINON	7.0	3.5	20.4	18.3	7.6	9.3	3.6	11.2	28.5	30.1	31.6
57701	MALATHION	10.3	22.0	12.7	14.5	28.8	15.2	59.7	27.8	58.9	44.7	45.4
6501	AROMATIC PETROLEUM DERIVATIVE	13.3	25.9	19.7	23.5	21.6	30.4	74.8	27.4	46.4	30.3	41.4
10501	DICOFOL	9.1	16.1	10.7	17.2	4.2	12.3	4.3	13.8	38.3	50.4	38.1
103301	ORTHENE	15.5	1.2	30.5	17.4	73.2	20.6	7.8	36.6	40.1	49.0	32.8
86803	XYLENE RANGE AROMATIC SOLVENT	29.5	35.1	52.2	79.6	40.1	43.8	36.8	63.1	63.5	-	41.8
CLASS		8.4	12.7	11.4	18.0	23.8	22.1	15.4	17.1	31.9	31.8	29.0

Appendix E (continued)

CHEMCODE	CHEMICAL	NATIONAL	REGION 1	REGION 2	REGION 3	REGION 4	REGION 5	REGION 6	REGION 7	REGION 8	REGION 9	REGION 10
	INDUSTRY SECTOR = TREE PRODUCT CLASS = MICROBICIDE											
14701	CALCIUM HYPOCHLORITE	59.0	59.9	59.9	-	-	59.3	-	-	-	-	-
SECTOR		7.7	12.0	13.8	17.5	19.8	19.6	13.5	31.8	30.9	29.4	29.1
	INDUSTRY SECTOR = TREE AND/OR LAWN PRODUCT CLASS = FUNGICIDE											
6601	PETRO. DER. AROM. HYDROCARBONS	27.1	-	48.3	39.4	38.3	40.6	32.8	69.1	63.5	65.3	37.5
99101	BENLATE	14.0	32.7	24.3	63.8	24.6	25.3	46.8	42.2	63.5	40.6	52.6
14505	MANEB	40.7	-	33.3	77.7	41.2	41.5	36.8	-	-	-	-
76702	CALCIUM POLYSULFIDE	37.1	-	-	-	64.0	41.2	-	51.3	-	-	-
79801	THIRAM	33.4	-	33.5	-	64.5	58.9	-	-	-	-	-
81901	BRAVO	35.6	-	56.4	57.6	37.7	48.4	36.8	69.1	-	63.2	52.6
14504	DITHANE M-45	25.2	37.7	-	44.6	41.8	-	-	45.1	-	65.3	-
81301	CAPTAN	22.5	38.0	31.6	45.5	34.8	32.8	-	80.9	-	72.9	47.8
14506	ZINEB	47.7	-	55.8	35.4	53.9	46.2	88.6	70.6	-	-	-
8101	BASIC COPPER SULFATE	47.7	-	59.2	-	53.9	46.4	-	50.0	-	60.7	63.4
CLASS		21.6	26.4	44.3	34.3	20.8	21.8	33.6	31.7	56.7	32.7	36.1
	INDUSTRY SECTOR = TREE AND/OR LAWN PRODUCT CLASS = HERBICIDE											
9801	BETASAN	28.6	31.3	34.7	72.6	47.5	24.7	39.0	68.7	74.4	59.3	-
30019	DIETHYLAMINE 2,4-D	19.7	23.8	24.2	72.1	25.2	23.5	63.5	47.6	60.8	29.5	38.7
90501	ALACHLOR	63.4	-	-	-	-	47.1	-	-	63.5	-	-
108801	METOLACHLOR	63.5	-	-	-	-	-	-	-	63.5	-	-
30056	BUTYL 2,4-D	63.4	-	-	-	61.7	-	-	-	63.5	-	-
24401	COPPER SULFATE PENTAHYDRATE	55.7	59.9	56.4	-	-	-	-	-	-	-	63.4
32201	DIQUAT DIBROMIDE	52.9	-	56.4	-	75.1	59.4	-	-	-	35.7	63.4
80807	SIMAZINE	27.2	28.0	56.4	59.3	40.2	56.8	46.2	51.7	55.5	41.9	41.0
38904	ENDOTHALL, DIPOTASSIUM SALT OF	56.4	-	56.4	-	-	-	-	-	-	-	-
78701	DACTHAL	27.9	65.7	52.5	60.4	48.8	46.5	40.5	43.1	63.5	-	33.9
CLASS		20.7	22.3	43.5	67.9	24.7	20.4	29.1	39.6	61.8	26.7	24.6
	INDUSTRY SECTOR = TREE AND/OR LAWN PRODUCT CLASS = INSECTICIDE											
63503	REFINED PETROLEUM HYDROCARBONS	41.7	24.9	48.6	39.9	22.2	49.6	36.2	47.6	63.5	59.9	52.6
57801	DIAZINON	22.1	20.0	21.3	37.3	32.2	46.3	15.4	45.7	60.4	22.4	26.6
6501	AROMATIC PETROLEUM DERIVATIVE	22.6	18.7	26.5	41.2	25.3	40.6	38.2	32.4	57.1	31.1	36.5
86802	DIMETHYLBENZENE	11.5	20.3	24.7	29.5	24.8	30.1	32.2	33.3	82.1	48.7	42.2
56801	CARBARYL	12.3	34.7	21.7	19.0	19.8	39.4	32.9	37.9	56.9	41.3	55.6
57701	MALATHION	12.6	21.4	27.6	25.2	28.6	29.4	31.6	58.4	51.5	31.4	38.7
59101	CHLORPYRIFOS	18.8	26.6	21.8	54.0	25.1	35.1	40.4	64.8	63.5	56.2	30.3
86803	XYLENE RANGE AROMATIC SOLVENT	25.6	41.8	27.7	66.8	38.9	44.8	48.0	66.8	-	65.1	-
57201	THIMET	63.5	-	-	-	-	-	-	-	63.5	-	-
34001	METHOXYCHLOR	14.3	23.0	25.9	39.0	51.1	43.2	80.1	40.0	-	53.8	-
CLASS		16.7	15.9	17.6	32.4	17.9	28.8	18.4	30.4	51.0	56.5	28.0

Appendix E (continued)

CHEMCODE	CHEMICAL	NATIONAL	REGION 1	REGION 2	REGION 3	REGION 4	REGION 5	REGION 6	REGION 7	REGION 8	REGION 9	REGION 10
		INDUSTRY SECTOR = TREE AND/OR LAWN				PRODUCT CLASS = MICROBICIDE						
69149	DIDECYL DIMETHYL AMMONIUM CLORIDE	53.4	-	-	55.5	-	67.2	-	-	-	-	-
39107	TETRASODIUM EDTA	53.4	-	-	55.5	-	67.1	-	-	-	-	-
73506	SODIUM CARBONATE	53.4	-	-	55.5	-	67.1	-	-	-	-	-
72604	SODIUM METASILICATE	53.4	-	-	55.5	-	67.1	-	-	-	-	-
CLASS		53.4	-	-	55.5	-	67.1	-	-	-	-	-
		INDUSTRY SECTOR = TREE AND/OR LAWN				PRODUCT CLASS = VERTEBRATE PESTICIDE						
88601	ZINC PHOSPHIDE	59.4	-	-	-	-	59.4	-	-	-	-	-
76901	STRYCHININE	53.8	-	-	-	-	-	-	-	-	53.8	
CLASS		49.1	-	-	-	61.7	59.1	-	-	-	53.8	-
SECTOR		13.4	14.8	24.5	38.8	15.2	17.8	15.8	30.8	59.9	47.8	28.1
		INDUSTRY SECTOR = STRUCTURAL				PRODUCT CLASS = FUNGICIDE						
63503	REFINED PETROLEUM HYDROCARBONS	36.6	0.0	-	38.7	29.5	52.7	41.8	46.8	-	39.8	38.2
63001	PENTACHLOROPHENOL	65.6	-	56.0	-	40.5	44.8	-	-	-	66.8	41.6
23102	COPPER NAPHTHENATE	24.5	0.0	-	38.7	30.7	-	41.8	46.8	-	33.7	0.0
14506	ZINEB	16.7	-	16.7	16.7	-	-	-	-	-	-	-
77501	SULFUR	49.8	-	56.0	56.0	-	-	-	-	-	50.2	-
99101	BENLATE	16.0	-	16.7	16.7	-	-	54.3	63.5	-	50.7	52.6
6601	PETRO. DER. AROM. HYDROCARBONS	63.4	-	-	-	64.0	-	-	-	-	65.3	-
23104	COPPER SALTS OF ACIDS	51.3	-	-	-	-	-	-	51.3	-	-	-
81601	FOLPET	40.9	-	-	-	-	-	-	-	-	-	40.9
33901	DIACETONE ALCOHOL	54.9	-	-	-	-	-	-	-	-	54.9	-
CLASS		35.5	0.0	16.8	15.3	25.3	47.6	41.5	34.1	-	42.8	27.6
		INDUSTRY SECTOR = STRUCTURAL				PRODUCT CLASS = HERBICIDE						
30035	TRIISOPROPANOLAMINE 2,4-D	64.2	-	-	-	64.2	-	-	-	-	-	-
80803	ATRAZINE	4.2	-	-	0.0	-	44.9	45.1	45.1	45.1	65.3	-
80807	SIMAZINE	16.2	-	-	0.4	-	36.2	44.2	49.6	45.1	52.7	-
30056	BUTYL 2,4-D	25.6	-	-	0.0	-	-	45.1	45.1	58.8	-	-
5102	PICLORAM, TRIISOPROPANOLAMINE	64.2	-	-	-	64.2	-	-	-	-	-	-
35505	DIURON	28.6	-	-	43.9	-	-	55.4	43.4	60.3	55.8	-
30019	DIETHYLAMINE 2,4-D	30.6	-	-	36.5	-	0.0	-	40.6	41.4	-	40.9
30053	BUTOXYETHYL 2,4-D	64.2	73.8	-	-	64.2	-	-	-	-	-	-
9801	BETASAN	16.5	-	16.7	16.7	-	-	-	63.5	-	-	-
31453	BUTOXYETHYL 2-(2,4-D) PROPION.	64.2	73.8	-	-	64.2	-	-	-	-	-	-
CLASS		22.7	73.8	23.9	3.5	63.9	22.1	46.8	40.6	46.5	43.9	40.0

CHEMCODE	CHEMICAL	NATIONAL	REGION 1	REGION 2	REGION 3	REGION 4	REGION 5	REGION 6	REGION 7	REGION 8	REGION 9	REGION 10
		INDUSTRY SECTOR = STRUCTURAL				PRODUCT CLASS = INSECTICIDE						
63503	REFINED PETROLEUM HYDROCARBONS	12.1	15.9	12.9	21.5	14.9	12.4	6.4	11.1	15.9	9.3	28.1
58201	CHLORDANE	5.1	9.2	23.0	7.7	7.4	8.3	11.3	15.0	28.5	30.6	21.6
42003	ETHYLENE DICHLORIDE	21.2	-	-	-	0.0	5.0	65.0	43.5	21.8	-	52.3
78003	SULFURYL FLUORIDE	48.1	-	3.4	11.7	21.6	0.0	30.1	0.0	0.0	50.5	45.3
6501	AROMATIC PETROLEUM DERIVATIVES	7.4	13.8	10.2	8.1	8.8	14.2	20.6	21.0	23.0	29.5	27.1
16501	CARBON TETRACHLORIDE	21.1	-	-	-	0.0	60.9	65.0	43.5	21.8	-	52.3
86803	XYLENE RANGE AROMATIC SOLVENT	8.1	53.9	35.5	9.1	11.0	16.9	8.4	22.3	18.7	28.3	35.7
53201	METHYL BROMIDE	23.3	26.7	4.7	14.0	25.8	24.3	38.7	43.1	59.5	47.7	39.3
44801	HEPTACHLOR	8.0	-	41.2	8.6	10.9	12.9	6.5	21.2	21.5	50.1	23.3
57801	DIAZINON	8.8	16.9	15.6	11.0	24.8	10.8	8.7	14.1	20.8	14.7	32.2
CLASS		7.4	10.0	16.6	14.9	6.5	7.3	8.8	27.8	20.7	28.2	28.4
		INDUSTRY SECTOR = STRUCTURAL				PRODUCT CLASS = MICROBICIDE						
67002	PINE OIL	17.5	8.6	33.8	0.0	64.1	11.6	34.2	62.4	45.1	0.0	52.6
1501	ETHYL ALCOHOL	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
46901	BUTOXY ... ETHOXYETHANOL-IODINE	65.3	-	-	-	-	-	-	-	-	65.3	-
79009	SOAP	26.1	8.6	33.8	0.0	45.9	38.4	35.3	62.4	45.1	0.0	52.6
22101	CRESYLIC ACID, COAL TAR ACIDS	54.5	-	-	-	-	54.5	-	-	-	-	-
83501	TRIETHYLENE GLYCOL	0.4	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.0
69129	HYAMINE 2389	70.3	-	-	-	70.3	-	-	-	-	-	-
47501	PROPANOL	60.2	-	-	-	61.5	-	0.0	-	-	-	-
68604	DIPROPYLENE GLYCOL	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
76406	TRISODIUM PHOSPHATE	70.3	-	-	-	70.3	-	-	-	-	-	-
CLASS		17.1	8.6	33.3	0.0	44.6	21.2	10.4	53.5	39.2	60.1	42.9
		INDUSTRY SECTOR = STRUCTURAL				PRODUCT CLASS = VERTEBRATE PESTICIDE						
11402	POLYBUTENE	8.5	19.8	37.7	1.4	15.3	18.5	10.3	6.2	42.6	0.0	0.0
88601	ZINC PHOSPHIDE	19.8	28.8	27.1	48.4	9.4	26.0	35.6	10.7	27.8	18.3	37.3
63503	REFINED PETROLEUM HYDROCARBONS	2.4	39.9	0.0	2.0	0.1	19.1	51.9	1.7	-	0.0	0.0
11403	POLYISOBUTYLENE	18.7	70.8	56.4	17.8	44.5	25.9	41.9	41.8	-	-	-
86002	WARFARIN	14.9	27.1	17.0	16.6	50.3	62.9	38.8	31.1	45.1	-	36.9
67707	CHLOROPHACINONE	13.5	15.4	26.1	14.2	23.3	20.5	18.3	59.4	40.6	17.8	42.3
63502	MINERAL OIL, SEAL OR WHITE	56.0	56.0	56.0	-	-	-	-	-	-	-	-
69201	AMINOPYRIDINE	26.1	23.2	23.7	6.9	18.7	39.7	17.1	32.4	38.3	26.3	32.0
41601	ENDRIN	25.7	-	0.0	0.0	45.9	39.0	16.7	38.4	64.7	0.0	0.0
75003	SODIUM FLUOROACETATE	36.6	-	-	-	-	-	53.0	53.4	65.6	-	52.6
CLASS		6.0	18.3	33.5	14.6	10.3	12.3	17.6	4.8	38.2	4.2	35.5
SECTOR		7.1	9.9	16.5	13.8	7.1	7.3	8.8	26.1	20.4	27.5	28.9

Appendix E (continued)

CHEMCODE	CHEMICAL	NATIONAL	REGION 1	REGION 2	REGION 3	REGION 4	REGION 5	REGION 6	REGION 7	REGION 8	REGION 9	REGION 10
		INDUSTRY SECTOR = STRUCTURAL AND TREE AND/OR LAWN						PRODUCT CLASS = FUNGICIDE				
6601	PETRO. DER. AROM. HYTROCARBONS	25.5	23.6	42.9	60.0	54.4	53.0	32.1	-	38.0	-	58.0
14506	ZINEB	42.4	49.4	16.7	61.1	16.7	36.4	-	69.1	40.0	53.8	52.6
81901	BRAVO	22.9	-	-	-	26.6	47.1	39.7	-	34.2	50.4	-
39003	METAM-SODIUM	65.2	16.7	16.7	16.7	16.7	16.7	-	-	-	65.8	-
81301	CAPTAN	19.5	42.1	46.8	31.3	37.5	25.8	54.3	69.1	36.8	42.1	42.6
14504	DITHANE M-45	28.9	69.8	-	-	32.6	-	-	70.6	-	60.8	52.6
99101	BENLATE	13.3	16.7	27.3	26.9	27.3	37.9	27.1	-	40.0	26.4	41.7
34805	ZIRAM	43.2	-	-	-	-	-	-	-	-	-	43.2
6902	SODIUM POLYSULFIDE	63.5	-	-	-	-	-	-	-	63.5	-	-
44301	DODINE	45.2	-	-	-	-	-	-	-	-	-	45.2
CLASS		19.3	27.5	41.7	58.6	25.5	33.2	28.4	40.5	38.1	38.7	39.8
		INDUSTRY SECTOR = STRUCTURAL AND TREE AND/OR LAWN						PRODUCT CLASS = HERBICIDE				
80803	ATRAZINE	45.8	-	-	-	-	-	50.3	-	74.6	58.5	48.8
35505	DIURON	42.0	-	42.9	42.9	-	-	46.9	41.8	-	56.6	35.1
12301	HYVAR X	47.2	-	42.9	42.9	53.9	-	49.5	41.8	-	36.3	30.3
11104	SODIUM METABORATE	48.2	-	-	-	64.0	-	50.3	-	59.2	61.3	-
73301	SODIUM CHLORATE	47.6	-	-	-	64.0	-	50.3	-	59.2	61.3	-
30019	DIETHYLAMINE 2,4-D	19.8	-	59.2	50.5	37.2	45.0	47.1	36.5	63.7	41.0	27.7
80804	PROMETON	43.1	-	54.1	64.8	43.7	49.3	48.2	-	59.2	59.8	52.6
9801	BETASAN	29.2	44.4	59.2	-	64.0	36.5	42.1	41.2	70.7	65.3	-
38904	ENDOTHALL, DIPOTASSIUM SALT OF	59.7	69.8	-	-	64.0	-	-	-	-	-	-
30053	BUTOXYETHYL 2,4-D	62.9	33.8	-	45.5	64.2	-	-	-	-	-	43.9
CLASS		35.4	65.8	26.3	31.9	34.5	49.1	48.5	34.2	51.4	47.2	25.1
		INDUSTRY SECTOR = STRUCTURAL AND TREE AND/OR LAWN						PRODUCT CLASS = INSECTICIDE				
86802	DIMETHYLBENZENE	56.5	13.5	28.5	16.2	9.3	82.8	42.6	36.3	32.5	26.8	31.5
6501	AROMATIC PETROLEUM DERIVATIVE	9.6	17.4	18.4	17.5	13.9	24.4	10.6	19.9	41.2	18.6	38.0
63503	REFINED PETROLEUM HYDROCARBONS	11.4	20.2	21.1	14.7	20.1	36.7	21.4	23.8	32.2	21.3	25.7
53201	METHYL BROMIDE	20.4	-	-	-	21.1	-	54.3	-	36.8	45.2	36.8
34001	METHOXYCHLOR	69.0	14.5	27.8	16.7	16.8	82.6	54.3	70.6	-	-	36.1
58201	CHLORDANE	10.9	33.3	35.4	55.8	25.6	27.8	9.0	28.6	31.3	36.4	14.0
42003	ETHYLENE DICHLORIDE	37.1	-	-	-	-	54.4	54.2	50.5	-	-	48.8
57801	DIAZINON	11.3	16.2	17.0	39.1	18.9	27.8	21.2	29.9	28.1	17.9	17.7
78003	SULFURYL FLUORIDE	17.4	-	-	-	19.3	-	54.3	-	-	45.2	-
59101	CHLORPYRIFOS	12.1	40.3	21.3	47.8	16.3	47.6	13.3	29.0	51.6	23.6	21.0
CLASS		19.2	13.1	24.6	15.2	12.2	76.2	15.5	24.6	27.9	19.6	39.2

Appendix E (continued)

CHEMCODE	CHEMICAL	NATIONAL	REGION 1	REGION 2	REGION 3	REGION 4	REGION 5	REGION 6	REGION 7	REGION 8	REGION 9	REGION 10
		INDUSTRY SECTOR = STRUCTURAL AND TREE AND/OR LAWN						PRODUCT CLASS = MICROBICIDE				
69153	ALKYL TRIMETHYL NH4 BROMIDE	53.9	-	-	-	53.9	-	-	-	-	-	-
69104	BTC 776 OR 824	53.2	-	-	-	64.2	-	-	-	-	-	-
69154	ALKYLDIMETHYLETHYLBENZYL NH4 CL	53.2	-	-	-	64.2	-	-	-	-	53.8	-
83501	TRIETHYLENE GLYCOL	64.2	-	-	-	64.2	-	-	-	-	53.8	-
68603	PROPYLENE GLYCOL	64.2	-	-	-	64.2	-	-	-	-	-	-
CLASS		39.2	-	-	-	47.8	-	-	-	-	53.8	-
		INDUSTRY SECTOR = STRUCTURAL AND TREE AND/OR LAWN						PRODUCT CLASS = VERTEBRATE PESTICIDE				
11402	POLYBUTENE	50.1	-	56.0	-	75.2	43.3	50.3	-	-	-	-
11403	POLYISOBUTYLENE	42.5	-	-	-	64.2	52.7	50.3	-	-	45.2	-
67704	PIVAL, SODIUM SALT OF	52.3	-	-	-	52.3	-	-	-	-	-	-
88601	ZINC PHOSPHIDE	39.7	-	-	-	61.3	-	33.3	63.5	22.1	65.3	38.0
41601	ENDRIN	46.4	-	-	-	-	52.7	-	-	36.8	-	36.8
86001	FUMARIN	43.1	-	-	-	53.9	-	35.8	-	-	45.2	-
56704	TOBACCO DUST	65.0	-	-	-	-	65.0	-	-	-	-	-
80501	TOXAPHENE	53.4	-	-	-	-	-	53.4	-	-	-	-
63503	REFINED PETROLEUM HYDROCARBONS	54.3	-	-	-	-	-	54.3	-	-	-	-
69201	AMINOPYRIDINE	36.2	-	-	-	37.8	-	53.1	-	36.8	39.3	29.0
CLASS		49.6	42.3	55.4	59.2	42.2	42.3	50.3	47.8	22.3	41.7	22.9
SECTOR		16.9	12.8	22.3	20.8	11.7	73.9	28.2	22.3	33.2	22.9	28.2

Appendix F

Relative Standard Errors of National Estimates of Active Ingredient Usage in 1981 by Product Class and Formulation

CHEMCODE	CHEMICAL	RSE
	PRODUCT CLASS = FUNGICIDE FORMULATION = DUST	
56502	PCNB	50.0
77501	SULFUR	60.2
79801	THIRAM (TETRAMETHLYTHIURAM DISULFIDE)	80.0
43401	ACTIDIONE	49.4
6301	STREPTOMYCIN SULFATE	50.6
34801	FERBAM	46.0
44301	DODINE (DODECYLGUANIDINE ACETATE)	56.0
FORMULATION		38.4
	PRODUCT CLASS = FUNGICIDE FORMULATION = GRANULAR/PELLETED	
56502	PCNB	21.3
81901	BRAVO	60.6
27301	CHOLRONEB	34.3
102001	METHYL THIOPHANATE	61.2
99101	BENLATE	55.5
109901	TRIADIMEFON	33.2
109801	IPRODINE	56.4
FORMULATION		22.3
	PRODUCT CLASS = FUNGICIDE FORMULATION = LIQUID CONCENTRATE	
81901	BRAVO	4.6
14505	MANEB	17.8
23102	COPPER NAPHTHENATE	21.3
63503	REFINED PETROLEUM HYDROCARBONS	21.2
39003	METAM-SODIUM	53.1
76702	CALCIUM POLYSULFIDE	30.4
6902	SODIUM POLYSULFIDE	48.3
23104	COPPER SALTS OF FATTY AND ROSIN ACIDS	32.5
60102	HYPOPHOSPHOROUS 2-(4-THIAZOLYL)BENZIMIDA	21.6
64104	SODIUM ORTHOPHENYLPHENATE	18.8
FORMULATION		9.4

Appendix F (continued)

CHEMCODE	CHEMICAL	RSE
	PRODUCT CLASS = FUNGICIDE FORMULATION = OTHER	
6601	PETROLEUM DERIVED AROMATIC HYDROCARBONS	15.1
63001	PENTACHLOROPHENOL	52.9
63503	REFINED PETROLEUM HYDROCARBONS	45.9
33901	DIACETONE ALCOHOL	54.9
63005	SODIUM TETRACHLOROPHENATES	53.8
63003	SODIUM PENTACHLOROPHENATE	53.8
FORMULATION		15.6
	PRODUCT CLASS = FUNGICIDE FORMULATION = READY-TO-USE SOLUTION	
77702	PROPIONIC ACID	64.2
99102	LIGNASAN BLP	58.3
FORMULATION		46.8
	PRODUCT CLASS = FUNGICIDE FORMULATION = WETTABLE POWDER	
99101	BENLATE	
14506	ZINEB	17.6
81301	CAPTAN	14.1
79801	THIRAM (TETRAMETHTLTHIURAM DISULFIDE)	24.9
77501	SULFUR	37.4
14504	EBDC, AS A COORDINATION PRODUCT	15.8
81901	BRAVO	22.0
44301	DODINE (DODECYLGUANIDINE ACETATE)	24.9
34805	ZIRAM (ZINC DIMETHYL DITHIOCARBAMATE)	33.7
8101	BASIC COPPER SULFATE	40.9
FORMULATION		6.7
CLASS		10.7
	PRODUCT CLASS = HERBICIDE FORMULATION = DUST	
28902	DALAPON, SODIUM SALT OF	56.4
36601	DIPHENAMID	54.5
FORMULATION		40.4

Appendix F (continued)

CHEMCODE	CHEMICAL	RSE
PRODUCT CLASS = HERBICIDE	FORMULATION = GRANULAR/PELLETED	
11104	SODIUM METABORATE	46.8
73301	SODIUM CHLORATE	46.8
84301	BENEFIN	24.7
80807	SIMAZINE	22.4
9801	BETASAN	16.6
80804	PROMETON	46.8
78701	DACTHAL	41.6
27401	DICHLOROBENZONITRILE	31.0
63003	SODIUM PENTACHLOROPHENATE	86.9
38904	ENDOTHALL, DIPOTASSIUM SALT OF	57.2
FORMULATION		35.8
PRODUCT CLASS = HERBICIDE	FORMULATION = LIQUID CONCENTRATE	
9801	BETASAN	6.3
30019	DIETHYLAMINE 2, 4-DICHLOROPHENOXYACETATE	6.4
31519	DIMETHYLAMINE 2-(2-METHYL-4-CHLOROPHENOX)	3.7
30035	TRIISOPROPANOLAMINE 2,4-DICHLOROPHENOXYA	48.7
29802	DIMETHYLAMINE DICAMBA	9.5
108801	METOLACHLOR	47.9
90501	ALACHLOR	50.8
30056	BUTYL 2,4-DICHLOROPHENOXYACETATE	38.6
31516	DIETHANOLAMINE 2-(2-METHYL-4-CHLOROPHENO)	13.5
30053	BUTOXYETHYL 2,4-DICHLOROPHENOXYACETATE	38.9
FORMULATION		7.6
PRODUCT CLASS = HERBICIDE	FORMULATION = OTHER	
30501	MCPA	72.1
19201	MCPB	73.5
5501	AMMATE	8.2
63503	REFINED PETROLEUM HYDROCARBONS	65.3
FORMULATION		55.0
PRODUCT CLASS = HERBICIDE	FORMULATION = PRESSURIZED	
4401	AMITROLE (3-AMINO-S-TRIAZOLE)	37.1
98801	CHLORFLURENOL	48.3
FORMULATION		36.2

Appendix F (continued)

CHEMCODE	CHEMICAL	RSE
PRODUCT CLASS = HERBICIDE	FORMULATION = READY-TO-USE SOLUTION	
38905	ENDOTHALL	69.8
107201	VELPAR	49.1
12502	SODIUM CACODYLATE	70.6
13803	MONOSODIUM METHANEARSONATE	80.1
12501	CACODYLIC ACID	70.6
FORMULATION		59.0
PRODUCT CLASS = HERBICIDE	FORMULATION = WETTABLE POWDER	
78701	DACTHAL	6.3
80803	ATRAZINE	38.4
35505	DIURON	35.9
12301	HYVAR X	40.2
80807	SIMAZINE	11.6
80804	PROMETON	35.1
105501	TEBUTHIURON	38.2
104201	SURFLAN	38.6
35509	SIDURON	17.8
101701	PRONAMIDE	24.9
FORMULATION		23.1
CLASS		12.9
PRODUCT CLASS = INSECTICIDE	FORMULATION = DUST	
11001	BORIC ACID	25.8
57801	DIAZINON	10.7
69004	PYRETHRIN COILS	35.7
56801	CARBARYL	14.0
75202	SODIUM FLUORIDE	30.5
72602	SILICA GEL	14.1
63503	REFINED PETROLEUM HYDROCARBONS	8.2
67501	PIPERONYL BUTOXIDE	7.3
72605	SILICON DIOXIDE	11.3
11102	BORAX	40.6
FORMULATION		10.0

Appendix F (continued)

CHEMCODE	CHEMICAL	RSE
PRODUCT CLASS = INSECTICIDE	FORMULATION = GRANULAR/PELLETED	
57801	DIAZINON	7.1
66501	ALUMINUM PHOSPHIDE	22.4
57201	THIMET	43.1
59101	CHLORPYRIFOS	18.8
90601	FURADAN	63.3
41101	MOCAP	26.3
109401	ISOFENPHOS	15.2
56801	CARBARYL	13.4
53001	METALDEHYDE	56.1
41701	DYFONATE	40.1
FORMULATION		10.6
PRODUCT CLASS = INSECTICIDE	FORMULATION = LIQUID CONCENTRATE	
58201	CHLORDANE	4.5
6501	AROMATIC PETROLEUM DERIVATIVE SOLVENT	7.2
63503	REFINED PETROLEUM HYDROCARBONS	16.0
86802	DIMETHYLBENZENE	37.5
86803	XYLENE RANGE AROMATIC SOLVENT	5.3
59101	CHLORPYRIFOS	19.0
57801	DIAZINON	6.7
44801	HEPTACHLOR	6.6
34001	METHOXYCHLOR	55.4
45101	ALDRIN	12.3
FORMULATION		8.1
PRODUCT CLASS = INSECTICIDE	FORMULATION = OTHER	
63503	REFINED PETROLEUM HYDROCARBONS	9.7
57801	DIAZINON	8.4
61501	PARADICHLOROBENZENE	29.1
63502	MINERAL OIL, SEAL OR WHITE	57.8
81101	TRICHLOROBENZENE	38.4
31608	CASTOR OIL	63.5
40501	CITRUS OIL	90.0
9001	LINDANE	38.4
22001	ASPHALT	0.0
99401	GUM RESINS	63.5
FORMULATION		9.6

Appendix F (continued)

CHEMCODE	CHEMICAL	RSE
PRODUCT CLASS = INSECTICIDE	FORMULATION = PRESSURIZED	
78003	SULFURYL FLUORIDE	41.4
53201	METHYL BROMIDE	16.4
63503	REFINED PETROLEUM HYDROCARBONS	6.5
81501	CHLOROPICRIN	30.6
78501	TETRACHLOROETHYLENE	10.2
84001	DDVP	11.5
13	TRICHLOROFLUOROMETHANE	10.2
14	DICHLORO DIFLUORO METHANE	10.2
67501	PIPERONYL BUTOXIDE	7.3
11001	BORIC ACID	23.7
FORMULATION		26.6
PRODUCT CLASS = INSECTICIDE	FORMULATION = READY-TO-USE SOLUTION	
42003	ETHYLENE DICHLORIDE	19.0
63503	REFINED PETROLEUM HYDROCARBONS	10.2
16501	CARBON TETRACHLORIDE	19.0
42002	ETHYLENE DIBROMIDE	18.6
77601	SULFUR DIOXIDE	19.0
6601	PETROLEUM DERIVED AROMATIC HYDROCARBONS	7.9
57001	OCTYL BICYCLOHEPTENE DICARBOXIMIDE	1.9
63502	MINERAL OIL, SEAL OR WHITE	19.8
63506	MINERAL SPIRITS (ODORLESS)	25.1
57701	MALATHION	30.6
FORMULATION		13.7
PRODUCT CLASS = INSECTICIDE	FORMULATION = WETTABLE POWDER	
56801	CARBARYL	8.2
105201	BENDIOCARB	21.5
103301	ORTHENE	13.7
57701	MALATHION	14.0
34001	METHOXYCHLOR	19.4
57901	TRICHLORFON	23.8
10501	DICOFOL	8.7
59201	PHOSMET	24.0
47802	BAYGON	19.8
58001	GUTHION	18.2
FORMULATION		6.5
CLASS		6.5

Appendix F (continued)

CHEMCODE	CHEMICAL	RSE
	PRODUCT CLASS = MICROBICIDE FORMULATION = LIQUID CONCENTRATE	
67002	PINE OIL	17.5
79009	SOAP	26.1
22101	CRESYLIC ACID, COAL TAR ACIDS & PHENOLS	54.5
69129	HYAMINE 2389	70.3
47501	PROPANOL	60.2
69153	ALKYL* TRIMETHYL AMMONIUM BROMIDE *(95%)	53.9
76406	TRISODIUM PHOSPHATE	70.3
69104	ALKYL* DIMETHYL BENZYL AMMONIUM CHLORIDE	53.8
69154	ALKYL* DIMETHYL ETHYLBENZYL AMMONIUM CHL	53.8
14701	CALCIUM HYPOCHLORITE	59.0
FORMULATION		21.8
	PRODUCT CLASS = MICROBICIDE FORMULATION = OTHER	
46901	BUTOXY...ETHOXYETHANOL-IODINE COMPLEX	65.3
46909	POLYETHOXY...ETHOXYETHANOL-IODINE COMPLEX	65.3
FORMULATION		65.3
	PRODUCT CLASS = MICROBICIDE FORMULATION = PRESSURIZED	
1501	ETHYL ALCOHOL	0.0
83501	TRIETHYLENE GLYCOL	1.7
68604	DIPROPYLENE GLYCOL	0.0
40501	CITRUS OIL	0.0
68603	PROPYLENE GLYCOL	40.8
69140	ALKYL* DIMETHYL BENZYL AMMONIUM CHLORIDE	0.0
69104	ALKYL* DIMETHYL BENZYL AMMONIUM CHLORIDE	40.8
69154	ALKYL* DIMETHYL ETHYLBENZYL AMMONIUM CHLORIDE	40.8
FORMULATION		1.0
	PRODUCT CLASS = MICROBICIDE FORMULATION = READY-TO-USE SOLUTION	
69183	WSCP	0.0
CLASS		16.5

Appendix F (continued)

CHEMCODE	CHEMICAL	RSE
PRODUCT CLASS = VERTEBRATE PESTICIDE		FORMULATION = DUST
88601	ZINC PHOSPHIDE	20.6
86002	WARFARIN	19.6
80501	TOXAPHENE	39.2
67707	CHLOROPHACINONE	9.5
69201	AMINOPYRIDINE	47.9
56704	TOBACCO DUST	65.0
611	DRIED BLOOD	65.0
55801	NAPHTHALENE	65.0
67701	DIPHACINONE	14.3
FORMULATION		19.0
PRODUCT CLASS = VERTEBRATE PESTICIDE		FORMULATION = GRANULAR/PELLETED
88601	ZINC PHOSPHIDE	6.0
86001	FUMARIN	23.9
76901	STRYCHNINE	16.5
69201	AMINOPYRIDINE	10.4
86002	WARFARIN	13.9
67703	PIVAL	10.4
67701	DIPHACINONE	4.9
112701	BRODIFACOUM	4.2
70801	RED SQUILL	52.7
67705	DIPHACINONE, SODIUM SALT OF	13.5
FORMULATION		5.3
PRODUCT CLASS = VERTEBRATE PESTICIDE		FORMULATION = LIQUID CONCENTRATE
67704	PIVAL, SODIUM SALT OF	34.6
75003	SODIUM FLUOROACETATE	36.6
67707	CHLOROPHACINONE	35.5
67703	PIVAL	28.5
86004	FUMARIN, SODIUM SALT OF	18.7
FORMULATION		21.3

Appendix F (continued)

CHEMCODE	CHEMICAL	RSE
PRODUCT CLASS = VERTEBRATE PESTICIDE FORMULATION = OTHER		
86002	WARFARIN	16.7
11402	POLYBUTENE	34.0
76104	SODIUM NITRATE	65.3
31604	HYDROGENATED CASTOR OIL	25.7
16001	CARBON	65.3
63502	MINERAL OIL, SEAL OR WHITE	65.3
77501	SULFUR	65.3
66502	PHOSPHORUS	65.3
FORMULATION		16.3
PRODUCT CLASS = VERTEBRATE PESTICIDE FORMULATION = PRESSURIZED		
63503	REFINED PETROLEUM HYDROCARBONS	2.4
11402	POLYBUTENE	2.4
FORMULATION		2.4
PRODUCT CLASS = VERTEBRATE PESTICIDE FORMULATION = READY-TO-USE SOLUTION		
11402	POLYBUTENE	46.8
11403	POLYISOBUTYLENE	22.3
41601	ENDRIN	22.7
63502	MINERAL OIL, SEAL OR WHITE	56.0
6601	PETROLEUM DERIVED AROMATIC HYDROCARBONS	32.6
53301	BAYTEX	32.6
169111	DIALKYL* DIMETHYL AMMONIUM BENTONITE *(A	56.0
FORMULATION		44.9
CLASS		38.5

APPENDIX G

Use and Interpretation of the Estimates of Relative Standard Error

The estimated precision of each of the usage totals presented in this report is given in terms of the relative standard error (RSE) of the total,

$$\mathrm{RSE} = \frac{(\hat{S}^2_{\hat{T}})^{\frac{1}{2}}}{\hat{T}} \times 100 \qquad (*)$$

where

$\hat{T}$ = the weighted estimate of the total amount of active ingredient(s),

$\hat{S}^2_{\hat{T}}$ = the estimated variance of $\hat{T}$, and

$S^2_{\hat{T}}$ = the variance of $\hat{T}$ (see Technical Volume II, Chapter 5).

In the absence of nonsampling errors, $\hat{T}$ and $\hat{S}^2_{\hat{T}}$ are unbiased estimates of their associated population parameters. That is, in repeated samples their average (i.e., expected) values are T and $S^2_{\hat{T}}$, respectively. Moreover, under certain regularity conditions

$$(\hat{T} - 2\,\hat{S}_{\hat{T}}\ ,\ \hat{T} + 2\,\hat{S}_{\hat{T}})$$

would constitute an approximate 95 percent confidence interval for T. That is, in repeated samples if one were to compute such an interval then on average (i.e., in expectation) 95 percent of such intervals would contain the true (but unknown) parameter value T. As such, readers wishing to lend this interpretation to the precision reported in preceding Appendices must first solve (*) for $\hat{S}_{\hat{T}}$

i.e., $$\hat{S}_{\hat{T}} = \frac{\hat{T} \cdot \mathrm{RSE}}{100}$$

and proceed to form the desired confidence interval in the indicated manner.

In the presence of nonsampling errors, $\hat{T}$ is not necessarily an unbiased estimator of T. Specifically, in repeated samples, $\hat{T}$ on average exceeds T by some amount, say $B_{\hat{T}}$, which is referred to as the expected bias. As discussed in Section 3.2, this potential bias is attributable to three main sources: nonresponse, quality of reported pesticide usage amounts, and analytic errors (including conversion of formulated product amounts to amounts a. i. via linking to a (possibly) generic registration number). Unfortunately, $B_{\hat{T}}$ is nonestimable from the reported data and associated survey design, a feature common to most (if not all) large survey efforts involving human populations in which participation is required to be on a voluntary basis. At a national level, T might be known (or at least well approximated) by industry data on manufactured amounts of an active ingredient in previous years. In such cases, overall bias for such chemicals could be approximated and an assessment made of it's significance. Such external data is generally not available for assessing regional and/or industry sector biases. More importantly, chemicals are not often used only by the industry under study, thus precluding any informed assessment of the industry-specific bias (i.e., apart from knowledge of the industry estimate not exceeding the "known" total across all industries). This reality is particularly important in NUPAS where no survey of its kind has been previously attempted. As such, apart from industry-specific chemicals (e.g., chlordane), perceptions as to the magnitude of $B_{\hat{T}}$ must be predicated on the thoroughness of the procedures employed, the number and nature of the responding firms (i.e., a large and diverse sample), and the knowledge that respondents were intended to be prime users of the resulting database as such should have been motivated to provide quality data. In more finite terms, any biases present in NUPAS estimates must be evaluated relative to the state of knowledge prior to the study. Viewed in this manner, NUPAS has undoubtedly reduced the biases significantly and will result in better business and regulator decisions being made. Finally, it should be recognized that nonsampling error affects precision both in expectation and its sample-based estimate. Specifically, in repeated samples the average (i.e., expected) squared difference between $\hat{T}$ and T, hereafter referred to as the mean squared error, can be expressed as

$$MSE_T(\hat{T}) = Var(\hat{T}) + B^2_{\hat{T}} \qquad (**)$$

where

$$Var(\hat{T}) = MSE_{E(\hat{T})}(\hat{T})$$

In this notation, $\hat{S}^2_{\hat{T}}$ is not an unbiased estimate of $Var(\hat{T})$ since the latter is the combined effect of both sampling and nonsampling errors. If nonsampling errors were independent of this sampling counterpart

$$Var(\hat{T}) = S^2_{\hat{T}} + M^2_{\hat{T}}$$

where

$M^2_{\hat{T}}$ = nonsampling error variance

Unfortunately, in the presence of nonsampling error bias, $\hat{S}^2_{\hat{T}}$ is no longer even an unbiased estimator of $S^2_{\hat{T}}$. It is unclear, therefore, how to compare

$$RSE = \frac{\hat{S}^2_{\hat{T}}}{\hat{T}} \times 100$$

with the preferred (but unavailable) estimate

$$RSE^* = \frac{\{MSE_T\ (\hat{T})\}^{\frac{1}{2}}}{\hat{T} - \hat{B}_T(\hat{T})}$$

The relative standard errors cannot with total impunity be claimed to be consistently too high nor too low. If, however, bias is dominated by random measurement error (i.e., $M^2_{\hat{T}} >> B_{\hat{T}}$) then the relative standard errors would be uniformly conservative (i.e., too small). Subjectively, random measurement error in NUPAS is conjectured to equal or exceed sampling error so that even if bias were negligible, the relative standard error could be understated by a factor of at least 1.4 (i.e., square root of 2). Future studies would presumably attempt to reduce remaining uncertainties but it is again emphasized that NUPAS has made major advances in improving what otherwise was (and would still be) the accuracy of usage estimates.